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OPERATION OF SEWAGE DISPOSAL PLANTS.

Purpose and Principle of Sewage Disinfection—Recent History—Condition of Liquid Necessary for Success—Application of Hypochlorite—Determining Size of Dose.

BY FRANCIS E. DANIELS, A. M.*

This is the seventh installment of a series of articles by Mr. Daniels. The others were as follows: January 15—Grit chambers and screens; regular frequent cleaning most important. February 19—Skimming, sedimentation and septic tanks; keeping daily records of operation; duplicate units; treatment of sludge and scum. March 10—Emscher tanks, principles of operation and design; baffles and scum boards; gas vents and scum; cleaning slopes and slots; drawing off sludge; sludge beds and sludge disposal. April 16—Contact and sprinkling filters—periods for each of the four phases; filtering medium and drainage; keeping surface open; automatic control apparatus; how to make putrescibility tests. May 21—Sprinkling filters, care of nozzles, settling basins; natural and artificial sand filters. June 18—Operation of sand filters; land treatment; sub-surface irrigation.

DISINFECTION.

The methods and processes previously described have had to do mainly with the primary object of sewage purification—its conversion into a stable form, so that it will not putrefy and create a nuisance, brought about by the oxidation of the organic matter. True it is that the older and slower processes, such as slow sand filtration, combined with the oxidation of the organic matter a very substantial bacterial reduction. But the more rapid methods, such as the contact or sprinkling filter processes, have comparatively little effect in reducing the numbers of bacteria, although the organic oxidation may be quite complete.

On the other hand, the process of sewage disinfection has for its sole purpose the destruction or elimination of bacteria, particularly the objectionable bacteria and the germs of diseases likely to be found in sewages or disposal plant effluents.

The pathogenic organisms are, after all, the direct sources of danger in the use of sewage-polluted waters, although an excessive amount of unoxidized sewage is fatal to fish life on account of its elimination of the necessary dissolved oxygen. Furthermore, shellfish are often so seriously contaminated by pathogenic organisms in sewage-polluted waters that disease results when these contaminated shellfish are eaten in the raw state. While long storage or other treatment of a moderately polluted water practically renders it safe for potable purposes, there has not yet been found a very practical and reliable method of disinfecting shellfish. And although the transfer of shellfish from polluted to pure water has a marked benefit upon their sanitary quality, yet the destruction of all pathogenic organisms at the mouth of the sewer would certainly aid in safeguarding the sanitary quality of the shellfish within the adjacent waters.

A great variety of processes for the disinfection of sewage and sewage effluents have been proposed from time

to time. Obviously the ones most desirable are those which are efficient at a reasonable cost. Among the agents proposed may be mentioned, heat, lime, acids, ozone, permanganates, salts of the heavy metals, and chlorine and its compounds. The actions, comparative results and costs of these agents have been discussed more or less at length by Rideal, Dunbar, Phelps, Kinnicutt, Winslow and Pratt, and others.

In New Jersey only three of the above agents have been used, namely, compounds of chlorine, sulphate of copper, and ozone. One ozone plant was established but later condemned and discarded. At another plant copper sulphate was used as a disinfectant for a contact bed effluent. It was found impractical and too costly to apply a sufficient quantity of copper sulphate to do effective work, and now plans are being made to substitute liquid chlorine. It is, of course, well known that copper sulphate is very efficient in the treatment of water supplies for the removal of algae, and it is also extensively used at one of our sewage plants to keep down excessive growths of the blue-greens.

The methods of sewage disinfection have for one or more reasons been limited to the application of chlorine or some of its compounds, notably calcium hypochlorite, or bleaching powder. The action of this substance upon bacteria has been known for a long time, although the first large scale experiments were conducted by the writer at Red Bank, New Jersey, in 1907, under the direction of Prof. E. B. Phelps. In that run the sewage from the whole town was treated for ten weeks, full accounts of which have already been published. In 1907-1908 the writer also carried on with Prof. Phelps, in Boston, extensive disinfection experiments on crude sewage and sprinkling filter effluents with both chloride of lime and other compounds of chlorine.

It was during a series of these comparative experiments in the autumn of 1907 that the writer needed a quick and sensitive indicator for available chlorine, in order to determine the rate of decrease in available chlorine after the addition of bleach to sewage. He and Prof. Phelps, in trying the contents of various bottles and test tubes from a dusty closet, found a substance in a tube, which gave a strong color with bleach. Upon deciphering the label it proved to be Ortho-Tolidin. The writer believes that this was the first time Ortho-Tolidin was used as an indicator for bleach, and although Prof. Phelps told several investigators about the test, an account of the "discovery" was never published. The substance dissolved in hydrochloric acid makes a very con-

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SEWAGE TREATMENT PLANT AT RED BANK.
In the house marked + the first large scale disinfection experiments on sewage were carried on in 1907.

venient quantitative as well as qualitative test for chlorine.

In 1909 the first chloride-of-lime sewage disinfection plant was built at Stone Harbor, New Jersey, accounts of which have been published in the annual report of the State Board of Health. Since that time disinfection has been established at two dozen or more sewage disposal plants in that state, treating raw sewage, tank effluents, contact bed effluents or final sand effluents, as the cases may require.

Unfortunately, in many cases, the nature and limitations of the process of disinfection are not well understood, and too much is expected from the treatment. Disinfecting chemicals are added for the purpose of destroying bacteria or germs, nothing else. In some cases odors are lessened, but the elimination of odors by means of chemicals is an expensive and impractical process, and it is far better to prevent the formation of the odors than to correct them with chemicals after they appear. One often finds persons and even town officials who suppose that the "chemicals" are for the purpose of "eating up" or consuming all the sewage matters, and when this is not done the plant is declared a rank failure. We recently found a plant attendant who had developed the practice of lifting a lid of one of the sewer manholes and dumping in a pail of chloride of lime once a day. Such a practice is not proper disinfection because for a short time more chemical than is needed is used up while for the rest of the day there is none at all. As a chain is no stronger than its weakest link, so a disinfecting plant must be kept running properly at all times. Every result should be good, regardless of averages over stated intervals of time.

CONDITION OF LIQUID TO BE DISINFECTED.

For good results two conditions of the utmost importance must be fulfilled. First, the material to be disinfected must be in proper condition to receive the treatment, and second, the dose must be constantly applied. In regard to the first condition, little difficulty will be encountered with good tank or bed effluents, but with crude or raw sewage the suspended matters must be re-

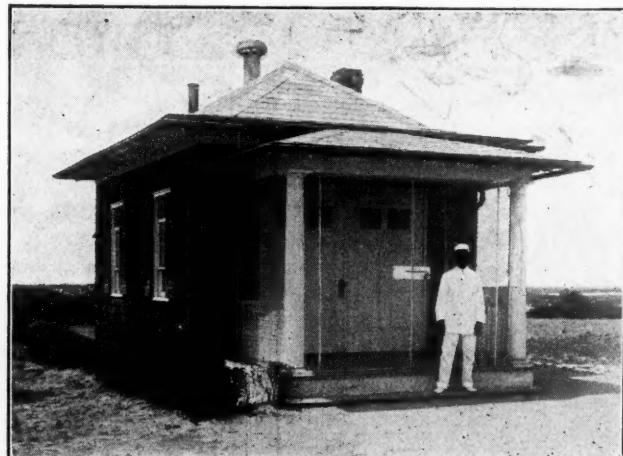


FIRST CHLORIDE OF LIME SEWAGE DISINFECTION PLANT IN NEW JERSEY. BUILT IN 1909.

moved or else thoroughly broken up or disintegrated into very fine particles, as there is no penetration of the disinfectant into masses of organic matter. Failure to recognize this has been the cause of failure in more than one of our disinfection plants. Coarse screens or improperly designed tanks have allowed fresh feces and masses of other organic matter to pass out of the range of the chemicals before there was any action upon the bacteria within.

It has been very unfortunate in several cases that in Prof. Phelps' account of the Boston experiments the term "crude sewage" has been taken to mean sewage just as delivered from any sewer whatsoever. The Boston "crude sewage" and the crude sewage from the outfall sewer of a small town are two entirely different things from a disinfection point of view. While we obtained good results on the Boston sewage with eight parts per million available chlorine, a like disinfection of the sewage at some of our small towns cannot be obtained with one hundred parts, simply because of the condition of the suspended matter.

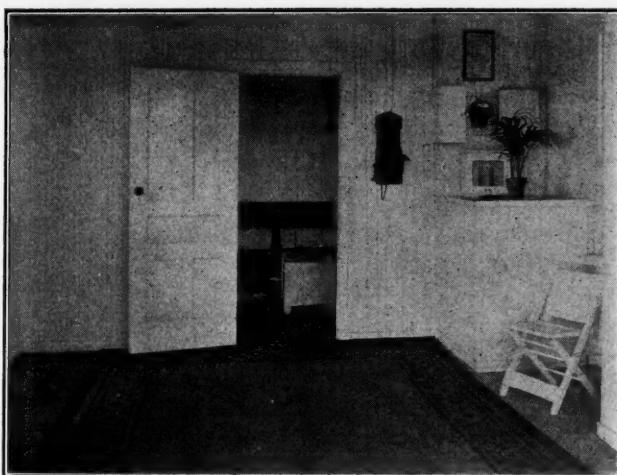
In the Boston experiments we pumped the sewage from the large Massachusetts avenue outfall sewer through a suction hose with a strainer on the end, which nearly always was more or less completely clogged with rags and paper. The sewage as delivered into the tanks was only slightly turbid on account of the removal and disintegration of the suspended matter. After the addi-



SCREENING AND DISINFECTING PLANT.
Attendant in Uniform.

tion of the bleach the sewage was repumped for two hours through a circulating pump. Samples were taken and tested at the end of one hour and two hours respectively. Note how different such conditions are from those obtained in the gravity outfall sewer of a small town.

And right here let it be emphasized that the results obtained at experiment stations must be carefully considered with regard to all of the conditions under which such results were obtained. It is very common to set up an experiment station for the purpose of determining the action of screens, tanks, beds, filters and what not upon the local sewage, and then deliver to the station for the experiments a little sewage pumped from the outfall main. The results obtained in this way are likely to differ in many respects from those obtained in a full-sized plant taking the whole gravity flow. An experiment station, to be of the most value to any particular case, should be of fair size and work under precisely similar conditions to those under which the big plant will have to operate. From the results of such a plant reasonably safe conclusions can be drawn. Further discussion of



INTERIOR OF SCREENING AND DISINFECTION PLANT.
Trap doors at the left of rug. Bleach is stored in the cabinet under the potted plant. Mixing and dosing are done in the rear room, where the dosing device can be seen.

experiment stations will be given in a subsequent chapter.

In the management of a sewage disinfection plant, therefore, the attendant must see that the liquids are properly screened, settled, filtered, or otherwise clarified so that the chemicals are able to reach the bacteria in accordance with the foregoing principles. In one of our plants the sewage is passed successively through screens of graded sizes, from coarse bar screens to woven-wire cloth of forty meshes to the inch. These screens are kept clean by an attendant who is in constant daily attendance, and the screenings are removed in tight receptacles and carted away. The accompanying illustrations show the appearance of the plant. The screens are reached through trap-doors. The chloride-of-lime is mixed and regulated in the rear room. The dosing is controlled by means of a variable head orifice which is raised or lowered in a constant level box, so that the dose of chemical is delivered into the last screen compartment proportional to the flow of sewage passing.

There is no odor or nuisance about this plant and everything is especially neat and tidy.

SIZE OF DOSE.

It is the care and management of the application of the hypochlorite that demands skilled supervision and attention. Several factors must be taken into account. First, the size of the dose. This is determined by the character of the sewage or effluent to be disinfected, and the degree of bacterial elimination desired. Stale septic sewage requires a much greater dosage than good effluents to obtain the same bacterial reduction.

In order to determine whether or not the dose is accomplishing its purpose, frequent careful bacterial tests must be made. These are the usual plating and presumptive fermentation tests, concerning which more will be said later, as they are laboratory tests and require certain laboratory facilities. The plating tests give the numbers of bacteria per cubic centimeter in the liquid before and after treatment, and the fermentation tests indicate the number of *B. coli*-like organisms before and after treatment. Thus the reduction in organisms by the treatment can readily be determined. It must be borne in mind, however, that the results are more or less relative and not absolute, because many other organisms are present in the sewage which are not shown by the above methods. Biological studies have shown that the pathogenic organisms are so susceptible to the action of the disinfectants that long before complete sterilization has been reached the disease-producing germs have been killed. This is most fortunate because in most cases a bacterial

reduction well up in the nineties may be obtained at a reasonable expense, while the complete elimination of the remaining few is practically impossible on account of the excessive cost of the required treatment.

It might be well to add a word of caution in regard to the use of the term "percentage reduction." A ninety-nine per cent reduction in a sewage carrying ten million bacteria per cubic centimeter will still leave one hundred thousand per cubic centimeter or five thousand bacteria in each and every drop—quite a number. Again, if in the treated liquid there are suspended particles of human excreta, into which the disinfectant has not penetrated, it is fair to assume that there is a chance of dangerous organisms escaping unharmed. Proper conclusions cannot be drawn from bacterial figures unless they are reliable and the true conditions are represented.

It is customary to speak of the dose as so many parts per million of available chlorine. This means that enough pounds of the hypochlorite are added to a million pounds of sewage to give the stated number of pounds of chlorine. For instance, in the analysis of the hypochlorite, which consists of calcium, oxygen and chlorine, the chlorine is liberated and its amount determined; and as the total quantity of the hypochlorite is proportional to the chlorine it contains this is a convenient way of designating the strength of the material. Thus, if the chloride-of-lime contains about one-third chlorine then twenty-five pounds in a million gallons of sewage will give a dose of about one part per million of available chlorine.

(To be continued.)

SEWAGE DISPOSAL IN MASSACHUSETTS.

When sending at our request a list of the sewage disposal plants in Massachusetts, the chief engineer of the State Board of Health, X. H. Goodnough, kindly furnished us with recent information concerning some of the more important installations.

The plant at Worcester, one of the two large chemical plants of the country, we have described and several times referred to. At the present time the chemical precipitation tanks are used for the treatment of night sewage only and the effluent is discharged directly into the river. The day sewage is discharged onto sand filters at the average rate of 57,000 gallons per acre per day.

In Brockton, the sewage of the city had for some time been purified by intermittent filtration, an average of 1,752,000 gallons per day on 37 acres. In 1911, a revolving screen was installed and in 1912-1913 half an acre of trickling filters were added. These filters are 6 feet deep, composed of stones varying between 3 inches and 1 1/4 inches. They are used for only a portion of the sewage. The rate of operation averages 1,800,000 gallons per acre per day. The trickling filters are constructed near the summit of the force main as it enters the filtration area and are high enough to make it practicable to refilter the effluent on the existing filter beds, after first passing it through a humus tank.

Fitchburg, with a population of 37,826, now has under construction treatment works consisting of five preliminary settling tanks of the Imhoff type; three acres of trickling filters, using broken stone of 1 to 2 inches diameter, 10 feet deep; and four secondary settling tanks. The sewage is at present discharged unpurified into the north branch of the Nashua River.

Concerning the use of sub-surface filtration, Mr. Goodnough writes: "The sub-surface disposal of sewage with a proper area and the necessary care is capable of giving very satisfactory results, indeed, as shown by the experience at these places (the state normal schools at Barn-

stable and Framingham, and Wellesley college). The entire disposal works are beneath the surface until the sewage emerges as purified effluent from the sub-surface filters. The effluents from well constructed and properly managed filters of this kind are equal to the effluents from well managed intermittent sand filters, which means that the effluent which emerges has the appearance of clear spring water.

"Such works are, of course, adapted only to comparatively small communities, yet they afford the most satisfactory method of sewage disposal possible for very small villages and country houses in regions where land composed of gravel or sandy soil is readily available, as is the case in considerable portions of New England."

CINCINNATI'S SEWERAGE REPORT.

What is, we believe, the most complete report on the sewerage of a city which has been published for some time, if, indeed, any report has been prepared in this country which is more comprehensive, was submitted to H. M. Waite, chief engineer of the Department of Public Works, by H. S. Morse, engineer in charge, and Harrison P. Eddy, consulting engineer, on December 31 of last year, and transmitted by him to Victor T. Price, director of public service of Cincinnati, Ohio, and by him to the mayor; to be published later in book form, in which form it has recently been made public. This report occupies 730 pages of fine type, in addition to which are a dozen or more tables, diagrams, etc., on insert sheets.

The report devotes thirty-two pages to a general report or outline of the matter treated and some of the conclusions reached. This is followed by 600 pages treating of the history of Cincinnati's sewerage system; the making of an underground survey for determining the exact facts concerning the existing system; a topographical survey on which to base future plans; studies of rainfall and runoff data, and the planning of new and relief sewers, of intercepting sewers and creek mains. Finally the subject of disposal of the sewage, necessity or otherwise for treating it, etc., consumes more than 300 pages. The last hundred pages consist of six appendices dealing with the local problems of industrial waste and sanitary surveys of streams. The vast amount of data given may be inferred from the fact that the report contains about 240 tables, some of them so large as to occupy folded inserts.

Most of this report, of course, is of purely local interest, but there are certain theories of general applicability and other matters of interest to cities and sanitary engineers generally which we hope to abstract in future issues.

This report was made possible by an ordinance passed in council in February, 1912, authorizing a bond issue of \$125,000 for a thorough investigation of the existing sewers and a comprehensive survey of the city, and later by a further appropriation of \$55,000 for the preparation of sewerage plans.

The preliminary work included an underground survey to obtain records of existing sewers, and a topographic survey on which to base a map of the entire city, for which up to this time there had been no accurate and complete data. The logical order would have been to have completed these surveys before beginning the studies for the new sewers; but in order to expedite the work, since the surveys would require about two years for completion, the studies for the plans were carried on as rapidly as the information obtained from the surveys permitted. Work on the underground survey was begun in April, 1912, and it was expected at the beginning of this year that the plotting of the records

would be finished some time this month. The topographic survey was begun in May, 1912, and both field and office work were completed in December, 1913. The general plan for the new sewers has been made, but the working data of all the details have not yet been completed—in fact, the planning must continue indefinitely with the growth of the city and to provide for changing conditions and development of new territory.

Construction on the work recommended by this report has already been begun, three million dollars having been appropriated by the city last year for this purpose. Some indication of the extent of the underground survey may be had from figures given in the report that at the end of last year \$33,868 had been spent upon the field work, 496½ miles of streets being covered, and \$19,529 upon the office work. The average cost per mile for the field work was \$68.23, and for the drafting, \$50.79.

SEWAGE DISPOSAL AT NEWBERRY.

Septic Tanks and Percolating Filters for Town of Six Thousand Population—Graduated Filtering Material—Concrete Distributing Troughs.

By CHAS. C. WILSON, M. Am. Soc. C. E.

Newberry, S. C., a cotton manufacturing town of about 6,000 population, is built on a ridge between two forks of Scott's creek, which unite about a mile and a half beyond the town limits. The normal flow of each branch is about 3,000,000 gallons daily.

About the year 1900 the town installed a system of sewerage or, rather, installed two systems, one to serve each side of the ridge, and discharging into the two creeks within the town limits and close to thickly populated districts. The total discharge of both systems was 120,000 gallons daily.

Purification works were built at each outlet, consisting of a grit chamber, five 4-feet by 18-feet closed septic tanks and an open filter bed 40 feet by 50 feet, with vertical side walls of masonry. The material of the filter beds was broken brick, and the sewage was distributed by means of wooden troughs.

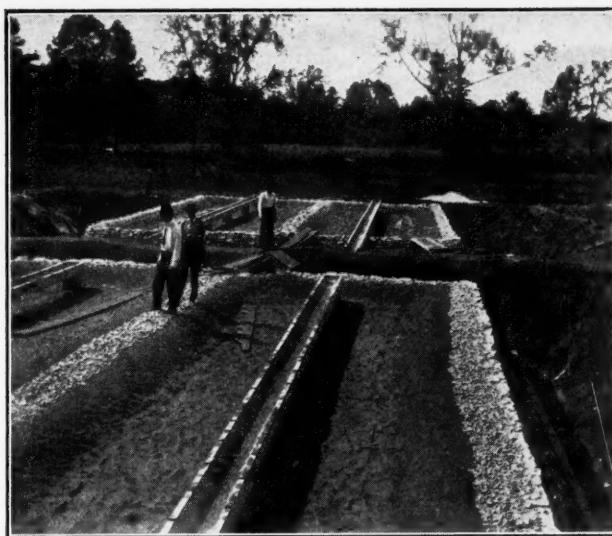
These disposal works did not prove successful; within a year they became so offensive that the sewers were bypassed around them and discharged directly into the creeks, the only effect of which was to distribute the nuisance over larger areas.

In 1907 the firm of which the author is a member was employed to investigate conditions, and suggest a remedy. We recommended tunnelling through the ridge, uniting the two systems and extending the outfall to the junction of the two creeks, a mile and a half distant, and there building new septic tanks and contact beds.

The people, after their first experience, had little faith in any system of sewage purification, and but for the intolerable existing conditions and the proposal to remove the nuisance to a safe distance out of town, the necessary funds would not have been voted.

We had had no previous experience in sewage purification, except some small private plants, but the writer had, in 1899 and 1900, made a very careful inspection and study on the ground of the leading disposal works in this country and in Europe, and he now undertook a new study of the subject, visiting a number of American works and giving special attention to the plant at Reading, Pa., designed by Messrs. Hering & Fuller.

We then decided upon septic tanks and percolating filters following closely the lines laid down by Dr. Dunbar of Hamburg in his "Principles of Sewage Treatment," 1908.



FILTERS COMPLETED.

The plant consists in general of grit chambers and covered septic tanks in duplicate, through which there is a continuous flow, and four filter beds, which are dosed alternately by automatic siphons.

Each grit chamber is 3 feet by 13 feet with a sloping bottom and a maximum depth of 4 feet. The flow into these chambers is controlled by a stop plank working in grooves in the concrete walls, a very poor arrangement dictated by economy in first cost. In each chamber we placed an inclined screen of $\frac{3}{8}$ -inch by 1-inch steel bars, 1 inch on centres, but soon found that the large amount of cotton in the sewage clogged them so rapidly as to render them a useless obstruction, and they were removed.

The septic tanks are 18 feet by 63 feet, 7 feet deep at the inlet and 5 feet at the outlet end. There is a dosing chamber 12 feet 6 inches by 37 feet and 2 feet deep, and four siphon chambers 3 feet by 4 feet by 5 feet, from which the siphons discharge alternately onto the four filter beds.

The sewage passes from the grit chambers into the septic tanks over a wier and then under a baffle wall and passes from the septic tanks to the dosing chamber under a baffle wall and then over a weir.

The septic tanks and grit chambers are each drained to the sludge pit through sluice gates at the low points, and the septic tanks are drained at a slightly higher point into the by-pass line to remove liquid sewage.

The covering of the septic tanks with wood is not satisfactory; it should have been of reinforced concrete, in spite of the very narrow cost limitations.

The intervals between siphon discharges is regulated by a valve, which is set by hand at any desired point. The minimum period is ten minutes, and the maximum three hours; and as the discharge alternates regularly from

one bed to another, the minimum period for an individual bed is forty minutes, and the maximum twelve hours. Normally the interval at which the siphons discharge is thirty minutes, and for each individual bed, two hours.

The four filter beds are each 43 feet by 57 feet at the bottom, 36 feet by 50 feet at the top, and 6 feet deep. The bottom is of concrete, with a smoothly troweled surface, sloping to a central concrete drain, and surrounded by a 6-inch concrete curb. Over the bottom of the beds 6-inch half round tile, notched out on the bottoms, are laid 12 inches on centres at right angles to the central drain. The central drain is covered by a reinforced concrete slab, laid on top of the drain tile.

The filtering material is in six layers, the first of broken stone 6 inches to 10 inches in size, 1 foot thick; the second, of stone 3 inches to 5 inches in size, 1 foot thick; the third of stone $1\frac{1}{4}$ inches to 3 inches in size, 18 inches thick; the fourth, of stone $\frac{3}{8}$ inch to $1\frac{1}{4}$ inches in size, and 4 inches thick; the fifth, of stone $\frac{1}{8}$ -inch to $\frac{3}{8}$ -inch in size, 4 inches thick, and the sixth, of sand, 1-25-inch to $\frac{1}{8}$ -inch in size, 1 foot thick. The stone layers are turned up at the sides and the centre of each bed, forming two sand basins on each bed 13 feet by 47 feet and 10 inches deep.

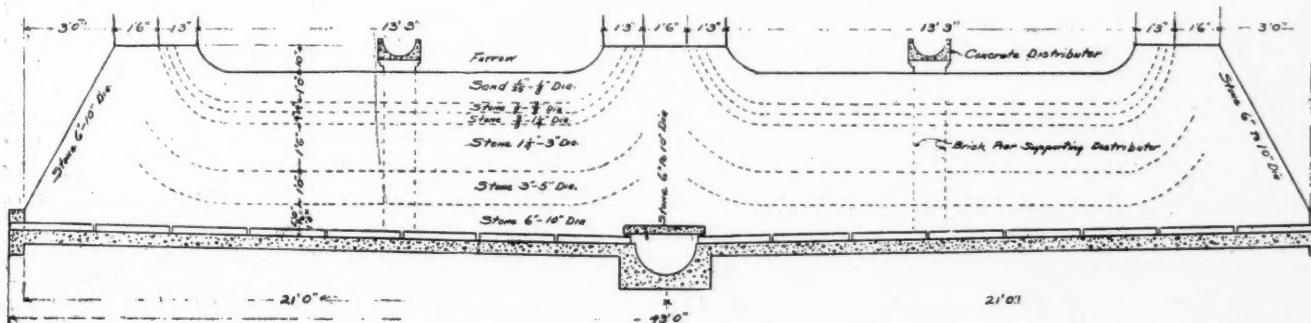
The sewage is distributed through reinforced concrete troughs, supported on concrete piers. These troughs have 2-inch by 2-inch notches, 24 inches on centres on each side, with a piece of 16-ounce copper built into the concrete and bent out to form a lip over which the sewage flows. The grade of the troughs was fixed experimentally, so as to give, with proper adjustment of the copper lips, a perfectly uniform flow through all the openings. A piece of flat stone was placed on the sand under each spout to prevent washing of the sand, and also to get better distribution by means of the splash.

The method of distribution is by no means ideal, and we would have much preferred sprinklers. There was no way, however, to get sufficient head to operate sprinklers by gravity, and pumping was out of the question, on account both of the cost of installation and the operating expense.

Thorough aeration of the filter beds was secured by the unconfined sides, the extension of the coarse material to the sides and top of the beds in three ridges and the extension of the drainage tile through the side curbs.

The rate at which these filters are now working is 221 gallons daily to each square yard of actual sand surface, and 63 gallons to each cubic yard of filtering material, against 270 gallons per square yard and 200 gallons per cubic yard in the Hamburg filters. It is believed, therefore, that this plant has sufficient capacity to allow for very considerable growth of the sewer system, but provision is made for adding new filter beds as needed.

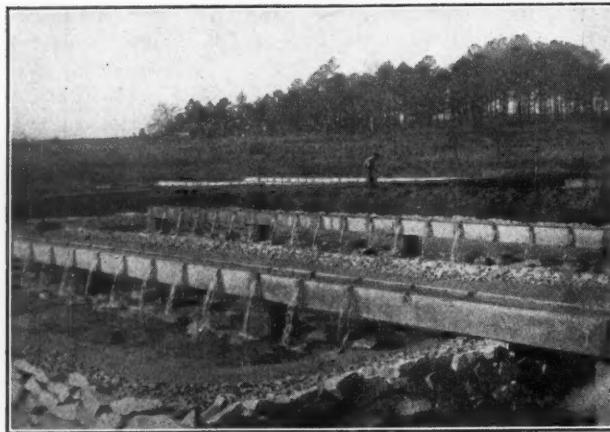
The total cost of construction, not including the outfall line, was \$11,880. The coarse stone was quarried on the site and broken by hand, the small stone was shipped



CROSS-SECTION OF FILTER, NEWBERRY, S. C., SEWAGE TREATMENT PLANT.

from a near-by crushing plant, and the sand was obtained in the creek within a few hundred feet.

The cost of operation is about \$300 per year, not including supervision. The superintendent of public works visits the plant daily, and has the top surface skimmed off and the beds thoroughly raked once a week. The sludge is drawn off once a year, during the winter months.



FILTERS IN OPERATION.

For one year after the completion of the plant in February, 1911, the writer visited it periodically, making close observations and collecting samples of the effluent. Since then he has had only verbal reports from the superintendent of public works and members of the commission. These reports indicate entirely satisfactory results, and there have been no complaints from property owners, either adjacent to the works or lower down the stream.

The effluent is clear and odorless, and during the first year was colorless, but is now slightly tinged with brown.

There have been no analyses of the effluent, but all the samples kept in closed bottles in a warm office for several days have proven non-putrescible.

Much credit is due J. T. Wardlaw, the resident engineer in charge of construction, for the intelligent and thorough manner in which he carried out the plans and instructions, and for many valuable suggestions as to various details. Great credit is also due H. W. Schumpert, the superintendent of public works, who is in charge of the operation and maintenance.

REDUCING CONTAGIOUS DISEASES IN AUGUSTA.

That, through the co-operation of the Board of Health and citizens, effective suppression of mosquitoes and flies can be brought about, so that the number of communicable diseases will show a marked annual decrease, is well shown in the report for last year rendered to the Augusta (Ga.) Board of Health by health officer E. E. Murphey. During 1913, the total number of deaths from malaria was 12, as against 27 in 1912; and the total number of deaths from typhoid in 1913 was 9, compared with 14 in the previous year.

"These figures," says the health officer, "I think, may be taken as evidence that the work which we are doing to control these two communicable maladies is not without results. The continuance of this work is, of course, inevitable, and must be carried out along the line of control of breeding places. The mosquito situation is, in my opinion, pretty well in hand, and the work which we are now carrying on at its present stage of efficiency will probably keep us free from mosquitoes and the infections which they carry. There is need, however, for more per-

sistent and energetic work with regard to the fly than we have done in the past. I do not think that any one will question that there were fewer flies in Augusta during the past summer than ever before, but there were too many, and there yet remain too many breeding places for these pests which need to be abolished or taken care of."

Except where no adequate sewerage system has yet been installed, the surface privy has ceased to be a problem. Difficulty has been encountered in securing proper assistance from owners of horse and cow stables. Closer supervision and more frequent inspections of these places will, therefore, be made this year. The board has been rigidly insisting upon the screening of foodstuffs and proprietors have given their measure of co-operation.

MARYLAND DEPARTMENT OF HEALTH.

The General Assembly of Maryland passed an act defining the powers of the State Board of Health which was approved April 16, 1914, and which seems to give the Board as comprehensive power over the health matters of the state as similar laws passed by any other state.

The law in general provides that all public and private systems of water supply, sewerage and refuse disposal in the state must file with the Board a certified copy of the plans of its plant, having such plans prepared if they do not already exist; that the Board may require the construction of plants of this kind where health conditions demand it, in its opinion; that it may require the effective operation of such plants, to the extent of ordering that a competent person approved by it be placed in charge of the system or plant; that no public or private system be built or extended until the plans be approved by the Board; that no corporation or individual may place land platted for sub-division upon the market until the Board has approved the methods proposed for supplying water and sewerage service; that the Board may prevent pollution of any water of the state by manufacturing wastes; that it may order any property to connect with a water supply or sewerage system, if such is available; that it may assume jurisdiction over the bottling and delivering of water for drinking purposes throughout the state, and the collecting and supplying of ice, either natural or artificial. It is also its duty to advise public authorities and individuals concerning proposed or existing water supply, sewerage or refuse disposal methods without expense to the parties making such inquiry. The Board may require all public and private corporations or individuals to keep such records concerning the matters above referred to as it may deem necessary.

Should any of the parties affected consider any of the orders or regulations of the Board to be unlawful, unreasonable or not necessary for the protection of public health or comfort, it may appeal to the circuit court of any county or to any judge of the Supreme Bench of Baltimore, and the case may be appealed to the Court of Appeals. Should any public or private parties fail to comply with an order of the Board, a penalty of not less than \$10 nor more than \$500 may be imposed, with an extra fine of not less than \$5 nor more than \$50 for each day beyond the time limit that the order is not complied with; suit being brought in civil action by the state of Maryland and the penalty to be paid in to the state treasury.

In order to raise the necessary funds for carrying out the orders of the State Board, any county, public water, sewerage or sanitary district, or municipality, may issue bonds, stocks or notes without legislative enactment or submitting it to a popular vote. The total outstanding

issue for this purpose, however, shall at no time exceed 2 per cent of the total assessed value of all property, but this amount may be in addition to the total indebtedness otherwise permitted by law. Money raised in this way must be used for no other purpose than carrying out the orders of the State Board of Health. An annual appropriation of \$25,000 is provided for the use of the Board.

The several rights and duties of the Board seem to be plainly expressed and properly conditioned in this act, and the powers of the Board seem to be ample to enforce any reasonable requirements, both penalty for disobedience of orders and appropriation for carrying on the work of the Board being provided; although the appropriation has been found to be too small for the very comprehensive duties placed upon the Board; and the fact that the enforcement of the orders of the Board, or rather the penalties for non-observance of them, lies with the state rather than with the Board itself, might very conceivably be a very weak point.

The Bureau of Sanitary Engineering of the State Department of Health, both of which existed prior to the act above referred to, began work on June 1, 1912, under the charge of Robert D. Morse as chief. Harry R. Hall was appointed assistant chief, and Frederick W. Caspari and John Hall as assistant engineers shortly after. Both Harry R. Hall and John Hall are graduate students of the Massachusetts Institute of Technology; the former had had over four years' experience with the engineering department of the Massachusetts State Board of Health, and the latter had been in the service of that board and of the New Jersey State Board of Health. Mr. Caspari had been assistant engineer of the Baltimore Sewerage Commission for more than six years. It is, therefore, seen that the executive force of the bureau had obtained experience in some of the most efficient health departments of the country. It was largely due to the investigations and report of this bureau in 1913 that the present law was passed in April of this year. Conditions in Maryland in regard to sewage disposal are still in rather bad shape, but a movement for the installation of both sewerage systems and treatment works is now active, and several systems and plants of considerable size are being designed for communities in the state.

TREATMENT OF URBAN STREAMS.

Little River, as it flows through Haverhill, Massachusetts, and especially that part from Washington square to Winter street, is bordered for the most part by rough stone walls which are in many places out of repair, while the bottom is irregular, being covered largely with stones and especially large quantities of detritus, including tin cans, wooden boxes, and much other refuse.

The water of the river above Winter street is used for manufacturing, a large part of the flow being used in various processes in the mills along the stream, and at times the entire flow of the stream below Winter street is highly colored with manufacturing waste. The city engineer, Louis C. Lawton, proposed laying a concrete pavement in the bed of the stream to a true grade, sloped so as to confine the dry weather flow to the middle of the stream. The State Board of Health, in reporting upon this plan, said:

"By carrying out the plan suggested the bottom of the channel would be materially improved, and by reconstructing or repairing the side walls the channel could be brought into such condition that—if floating matters are kept out of it and the bottom is kept free from detritus—its sanitary condition would be satisfactory; but the experience with similar channels flowing through densely populated districts has been that they are used to a very great extent as places of deposit for

such materials as are now found in the channel of Little River, including much foul organic matter, and it is very difficult, if not impracticable, even with careful inspection and frequent cleaning, to keep such channels in proper condition.

"In the opinion of the Board, the best practicable plan of preventing efficiently further nuisance from the channel of Little River, will be to cover the channel completely with a suitable structure capable of carrying off the flow of the stream at times of extreme freshet. The cost of such a channel will of course be much greater than the cost of improving the bottom of the stream alone, and—since it is very desirable that a material improvement in this stream is made at the earliest possible time—it is advisable to improve the bottom of the channel by covering it with concrete as proposed, and in carrying out this work to provide, so far as practicable, for the final covering of the channel throughout its length from Winter street to Washington square. Until the channel is covered, the board recommends that its use as a place of deposit for refuse of any kind be prevented, so far as possible, and that the channel be cleaned at the necessary intervals to maintain it in a satisfactory condition.

"The Board further recommends that foul manufacturing waste and other polluting liquids be disposed of into the sewers and the pollution of the stream be prevented."

RUN-OFF FROM SEWERED AREAS.

Result of Five Years' Investigation of the Subject by Committee of Engineers—Methods of Measuring Precipitation and Sewer Flow.

A report has recently been submitted to the Boston Society of Civil Engineers which presents the final results of seven years' consideration by a special committee of the subject of the run-off into storm sewers of the rainfall on municipal areas. The report occupies 90 pages, of which 42 are given over to tables and other data resulting from measurements actually made of rainfall and sewer flow. This committee was appointed on May 1, 1907, consisting of Irving T. Farnham, George A. Carpenter, Lewis M. Hastings, Harrison P. Eddy and Hector J. Hughes. During the seven years since that time Mr. Farnham has died, and the committee has been increased by the addition of William S. Johnson, Arthur T. Safford, George C. Whipple and Harold K. Barrows. A preliminary report was submitted in 1908 and progress reports in 1908, 1909, 1910, 1911 and 1912.

The report finally submitted after all these years is disappointing, probably not less so to the committee itself than to others. This unsatisfactory result can be attributed to the conditions involved in the subject investigated and not to the committee itself. It had been its original idea to secure the co-operation of a considerable number of engineers who would submit to it from time to time results of actual gaugings made; but both the committee and the co-operating engineers found that there was more difficulty in maintaining these gauging stations than they had anticipated, and the results obtained were so unsatisfactory that many abandoned the investigation as not worth while. This last was perhaps the most disappointing part of the report—that from the considerable amount of data which the committee actually secured, it seemed to be impossible to derive results which were sufficiently consistent to point to any definite conclusions. The committee, however, has given in the report all of the gaugings which they were able to collect, in order that the data may not be lost and in the

hope that hereafter the figures can be utilized and trustworthy conclusions drawn from them.

The report is divided into three main parts: 1. Methods of measuring precipitation; 2. Methods of measuring run-off; 3. Results of measurement of rainfall and run-off, showing relation between precipitation and flow in sewers. The first two parts consist largely of extracts from a forthcoming "Handbook on American Sewerage Practice," by Leonard Metcalf and Harrison P. Eddy, in which are described seven automatic rain gauges and the same number of gauges for recording flow in sewers; these descriptions being accompanied in the report by general remarks concerning the use of these appliances and other methods for securing similar data.

Concerning measurements of precipitation, the committee states that the automatic or recording rain gauge is the only type of rain gauge which is of use in studies of this character, because the records must be taken at any time, night or day, when a storm may occur, and because rates rather than total quantities are the most interesting feature from the point of view of the subject under consideration. "A point not always recognized in connection with automatic rain gauges is the great importance of a good clock movement which can be closely and accurately regulated. In comparing the records of several rain gauges, or the records of rain gauges with those of sewer gauges, the question of time is one of much importance."

Much more difficult than measurement of the rainfall is that of the storm water run-off. Weirs installed in sewers are objectionable because they back up the sewage, retard the velocity and cause deposits; and it is difficult to arrange them so as to give satisfactory results under wide variations of flow and with high velocities of approach. Venturi meters with recorders are expensive, difficult to install, and do not give accurate results under a sufficient range of flow. Current meters giving continuous records are not ordinarily practicable because foreign materials in the sewage are likely to clog or otherwise derange them. Consequently, gaugings of sewer flow have almost invariably been made by recording the level of the sewage flowing and computing the quantity of flow, using Kutter's formula with an assumed coefficient of roughness. This requires knowledge of the cross-section of the flowing stream, the slope and the coefficient of roughness. The first of these is easy to obtain. The hydraulic slope is ordinarily assumed as parallel to the invert of the sewer, but this is not always the case, the depth of sewage having been found in actual cases to alternately decrease and increase within a length of a few hundred feet of sewer of uniform size; and it is therefore evident that the use of the grade of the sewer as representing the hydraulic grade may result in serious errors in computing the flow, and the actual hydraulic grade should be ascertained. As the flow should be automatically recorded, for the same reason that the rainfall should be, it is necessary to have two or more water level indicators which are exactly synchronized with each other and with the rain gauges.

Even more difficult is the selection of the coefficient of roughness. Two actual coefficients derived from careful measurements of sewage flow in Pawtucket and in Philadelphia were found to be .009 and .017 respectively, and it is obvious that the assumption of a coefficient without experimental determination may produce errors possibly as great as 50 per cent. It therefore seems necessary to determine the coefficient for the sewer under consideration by actual experiments.

In sewers less than 4 feet in diameter, and in any

sewer where the normal dry weather flow is of very shallow depth, the installation of a recording device in the sewer itself is apt to produce such an obstruction to the flow as will set up artificial conditions which make a record of the correct depth of flow impossible. It therefore seems necessary to construct a special observation manhole at one side of the sewer in which to place the gauge and its appurtenances; the opening in the wall of the sewer for the pipe or pipes connecting it with this manhole being the only construction which would be likely to affect the flow. It is suggested that a still better plan would be to have the recording device at the edge of the curb and above the level of the sidewalk in a construction similar to a police signal box, so that the chart containing the record will be readily accessible. The charts should hold the record of not more than one or two days, and should be changed and the apparatus inspected at those intervals, so that it may be certain to operate and record properly whenever needed.

Maximum flow gauges the committee considers of little use except as checks upon the records of the automatic gauge. Practically the only information which the maximum flow gives is the highest point reached by the sewer flow, without any indication as to what time it occurred or how long it continued.

Concerning the records which the committee had collected, it states that all of them are open to serious criticism and their value as accurate measurements of run-off is not very great. Nevertheless, they are the only records available, and a careful study of them will offer many suggestions as to methods of improving the details of further studies, and will also furnish the best and, in fact, the only information available relating to the determination of coefficients of run-off or ratio between flows in storm water sewers and rainfall. The records given include those obtained at Pawtucket, R. I.; Wilmington, Del.; Newton, Mass.; Louisville, Ky.; Cambridge, Mass.; Philadelphia, Pa.; Rochester, N. Y.; New York City; Milwaukee, Wis.; Hartford, Conn.; Birmingham, England, and Chicago, Ill.

In concluding the report, the committee states that it is of the opinion that "more will be accomplished by a large number of gaugings of small drainage areas than by attempts to gauge areas of larger extent. With the smaller drainage areas the time of concentration will be less, and there will be a much larger number of storms in which there can be little doubt that the maximum rate of rainfall continued at a uniform rate for a sufficient period to produce the maximum observed run-off, and accordingly the resulting computed coefficient of run-off will be more nearly correct. In such cases, also, the difference between the computed time of concentration under conditions of maximum velocity through the sewer, and the time of concentration actually existing for any particular observation, will be slight. Moreover, in small districts, the main channels will not be large and the effect upon the results of storage in the sewers themselves will not be great. * * * It is very much to be desired that measurements of the flow from sub-districts which together make up a large district, whether or not the entire district is also gauged as a whole, should be undertaken as extensively as possible.

"Information relating to inlet time or time required from the beginning of the rain to the moment when the flow is established at the storm water inlet, is also of importance, and little or no accurate information is to be had upon this subject. We are pleased to state, however, that the city of St. Louis is about undertaking observations along this line, and it is hoped that information of much value will be available from their results in the near future."

MUNICIPAL WORK IN NEW ORLEANS

Extension of Sewerage, Water and Drainage Systems
Constructed by City Force in a Better Manner and
at Less Cost Than by Contract.

Last December the Sewerage and Water Board of New Orleans appointed a committee to investigate the cost of construction work which was being done through the forces of the board, as compared with the costs submitted by independent contractors; also as to the organization of the force employed by the board and the matter of wages and salaries. This committee submitted its report a few weeks ago advising against the continuance of doing the work of the board by its own employees rather than by contract. This was on the sole ground of cost, for the committee expressed itself as being "impressed with the fact that the design and the execution of the drainage, sewerage and the water systems of the city of New Orleans are exceptionally good, and reflect great credit upon those who are responsible therefor."

The cost of the work, which has been carried on under the supervision of George G. Earl, has averaged more than half a million dollars a year for the past six years, the totals for that time having been as follows: Sewer extensions, \$1,312,338; sewer house connections, \$395,874; water extensions, \$344,145; water house connections, \$1,253,462; drainage extension, \$101,506. These figures do not include any of the original construction performed by contract, nor do they cover any of the maintenance or operating expenses.

It speaks well for Mr. Earl and for all concerned that there seems to have been no claim or insinuation, in this report or from any other source, of dishonesty, graft, or inefficiency in any department. The nearest approach, to this is the claim that work done by municipal forces cannot by its very nature be as efficient as that done by a contractor, and that the maintenance of such a large force under one department offers every opportunity for the creation of a political machine; but these statements only emphasize the fact that no figures or facts appear to be brought forward to indicate that either of these objectionable features exists in connection with this work.

The committee says, however, that the "form of organization appears to this committee to have been the result of a gradual evolution rather than of a well considered schedule. It seems that as the scope and extent of the work has grown from time to time, the organization has been slightly readjusted to fit the requirements as nearly as may be. In such a process it was to be expected that certain tasks should be assigned to certain men rather because of availability and expediency than because of special fitness." The committee therefore recommends a new form of organization. It also found that many, if not most, of the laborers, were receiving higher wages than are commonly paid on other work in the vicinity. It believes that a contractor could purchase material more cheaply than the board, because he is more free to take advantage of the markets without being confined by the red tape of official business. The committee is of the opinion that foremen and assistant engineers cannot possibly be expected to be as efficient and have their heart as fully in the work as would be the case if they were working for themselves or for a contractor, and therefore it "is not within the range of probability, if indeed it is possible, for your labor, working less than fifty-four hours per week, imperfectly looked after by foremen and less looked after by general foremen and assistant engineers, to accom-

plish as much work as is done by a contractor's labor closely supervised by foremen, general foremen and contractor."

It is for these reasons, which the committee believes to be inherent in municipal work, that it advises that a large part of the work now being done by the Sewerage and Water Board should be done by contract in the future. It believes, however, that the construction of sewer and water house connections should continue to be done by the forces of the board, as well as the maintenance of the sewer, water and drainage systems, except when the extent of the work amounts practically to reconstruction.

The week following the presentation of this report, the board considered a communication from Mr. Earl, its general superintendent, answering the report of the committee. Mr. Earl presented figures to show that the cost during the six years for engineering and general expenses has not exceeded 8.6 per cent of the cost of the work. Taking the prices at which contracts were let in 1907 (the last year when this class of work was done by contract), the work which the board's forces have done for \$1,312,338 would have cost \$1,874,301, or 43 per cent more; whereas if the cost be compared to what it would have been under bids which were received and rejected for the identical work performed, a saving of 68 per cent is shown. It may be stated that the bids last referred to were considered excessive and were thought to indicate collusion among the bidders, which was the reason why the board decided to undertake the work itself.

Not only has this saving been made, but Mr. Earl considers (and we believe it was admitted by the committee) that the requirements of the board's forces for first-class construction work in all particulars have been just as rigid and the results have been better than the average of the contract work. Moreover, "the board's forces have never stinted prompt and reasonable street restoration and have occasioned infinitely less complaints from property owners and residents for disregard of public convenience. Further, they have worked against the handicap of jumping their construction gangs frequently from one end of the city to the other to install sewers where the greatest number of property owners desired sewerage connections. Every move of this character with a contractor would have brought an 'extra work' bill and claim for delay, etc., which claims, with the continual moves made by the board's forces, would have aggregated a very large amount under contract construction."

Concerning the paying of higher wages to laborers, Mr. Earl states that some years ago he tried the experiment of increasing the wages on a certain piece of work by 33 per cent to attract the best possible class of labor, with the result that the cost of the work was decreased about 20 per cent. He believes that by paying wages higher than the standard, the board obtains the best possible labor and now has the very pick of the experienced gangs developed under the various contractors during the past few years, and that the use of this class of men is decidedly economical.

The assumption by the committee that the employees of the board take little interest in their work "is an unwarranted assertion regarding a body of men who, as a rule, are sincerely interested in their work; who are using their utmost endeavor to make every dollar count to best advantage, and who are accomplishing magnificent results. * * * The board's forces are frequently drawn upon by contractors who offer larger financial inducement. The most notable instance of this was when Mr. Lee, superintendent of sewerage construction,

was taken away from the Sewerage and Water Board by a large contractor at over double the salary which he was being paid by the board. ***

"The assumption that a contractor could buy more cheaply than the Sewerage and Water Board just because he will try to do so, needs a good deal of proof. It takes cash money to buy cheaply, and the contractor almost invariably has to buy on long credit, while the Sewerage and Water Board is a recognized cash buyer and gets the keenest possible competition and the lowest cash price on all of its purchases, and is equally careful to purchase to advantage."

The committee had claimed that work was sometimes created or done unnecessarily in order to keep the forces of the board employed. In reply to this Mr. Earl stated that "the board's works are of sufficient magnitude to permit of such intelligent arrangement of necessary work and adjustment of total force as will maintain those conditions of reasonably continuous employment for valuable men and effective gangs which are essential to the most economic results. Disbanding an efficient force and re-establishing a new force is by no means the way to gain in efficiency, and any lack of foresight which involves this procedure more often than necessary will be costly. The necessity to do this is one of the serious handicaps under which most contractors suffer."

Mr. Earl gives several reasons why the forces under his charge should be able to do work cheaper than a contractor, most of which reasons would apply to any municipal work which was conducted as efficiently and as free from political interference as this appears to be. The reasons given by him are as follows:

First, the contractor must give a bond of 25 per cent. of the amount of his contract, which costs rather high and usually ties up his securities. The board, of course, has no bond to give.

Second, the contractor usually pays heavily for employees' liability or accident insurance, which the board does not find it necessary to carry.

Third, the contractor must submit to a retainer of 20 per cent. of his gross earnings until his contract is completed, and pay often high rates of interest on borrowed money until he can collect his retainer. The board has money on deposit on low rates of interest, and loses almost nothing in interest by paying it out as rapidly as its construction requires.

Fourth, the contractor must usually effect a new organization for each contract, taking his chances of getting a proper force for each contract which he obtains. The board arranges its work for continuous prosecution and carries forward a trained and tried organization of high efficiency.

Fifth, the contractor must provide equipment and yard facilities anew for almost every new contract, and must add enough to his prices to pay for these things, upon the assumption that they will have little or no value at the end of each particular contract. The board has permanent office and yard arrangements, common to and required for all of its work, far better than the contractor can afford to provide, and its construction equipment goes forward from job to job so long as it can be maintained in serviceable condition, being charged off against the work when it becomes useless.

These causes combined should, by every consideration of sound reasoning, give the board an advantage in force account work over contract work of from 10 to 15 per cent. Assuming that the contractor makes a profit of 15 per cent. the board should do the same work, therefore, from 25 to 30 per cent. below contract prices, containing a 15 per cent. margin of profit.

These advantages are only offset by one single disadvantage which the board's forces labor under when under honest and efficient direction. The board's forces must have a vastly greater regard for public convenience than can ever be enforced from contractors. In attempting to enforce such regard on a contractor he considers such attempt as a hypercritical enforcement of specifications, and

the public, who suffer, feel that there must be a laxity in proper enforcement.

The contractor simply will not make his plans with public convenience as one of the main factors considered, while the board's employees have it constantly in mind as one of the essential elements of consideration.

That its consideration has very materially increased the cost of the board's work does not seem to be true. Yet, if the contractor could be held as strictly to a similar course it would materially increase the cost of contract work to the board, because contractors would regard it as an unnecessary hardship, and it would not at all fit in with any plans for prosecution of work which they have in mind and this attitude would be reflected in much higher bids if the specifications called for and the contract enforcement maintained the same conditions as to prompt street restoration, limit of area to be open at one time, etc., etc., as the forces of the board impose upon themselves.

In concluding his reply Mr. Earl calls attention to the fact that the superiority of the work done by the municipal forces to that done by contract is indicated by the fact that during the past five years the department records show that the cost per year per mile of sewers in service for labor and material exclusively, for the replacement of sewers 31 inches or under in diameter which have had to be renewed, has been \$16.33 per mile for sewers constructed by contract, but only \$2.95 per mile for sewers constructed by the board's forces. As the latter have built 200 miles of sewers, this means an annual saving of \$2,676 for this maintenance work.

The reports are accompanied by a large mass of figures in detail which it is impossible to reproduce, but which seem to demonstrate that the citizens of New Orleans have been getting better work done at less cost when it has been done by the forces of the board than when it was done by contract. This also seems to have been the conclusion of the board itself, since it voted unanimously to direct the preparation of a bill to be presented to the Legislature which would permit the board to continue doing construction work with its own forces.

It does not, of course, follow that any city could obtain equal advantages by performing work of this character directly rather than by contract; but on the other hand, it does seem to show that it is not impossible for a city to do so when the work can be conducted under a good manager and on broad lines of ultimate efficiency and without interference for political or any other reason aside from that of securing the best work at the lowest cost.

VOTE ON NEW CHARTER FOR SEATTLE.

On June 30, the same day on which, as described in our issue of July 9, the voters of St. Louis adopted a new charter for that city, those of Seattle failed to adopt the charter proposed for their acceptance. The Seattle charter was voted upon at a special election called for this purpose alone, and only about one-fourth of the total registered vote appeared at the polls. We are informed by Dr. Herman A. Brauer, of the Bureau of Municipal Research of the University of Wisconsin, that in his opinion the defeat of the charter was due to the greater activity of influential citizens and organizations which were opposed to the new charter, to the absence of any widespread dissatisfaction with the present regime, and to a general adoption of the wise popular maxim, "Not to act at all when in doubt." He considers it probable that an effort will now be made to amend the existing charter so as to include some, at least, of the more important features of the charter which has just been defeated.

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JULY 16, 1914.

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Land Treatment of Sewage.

From the very beginning of the sewerage of cities, the disposal of the sewage upon land has seemed to be the theoretically ideal one as to simplicity, low cost of operation and degree of purification theoretically practicable; with the additional argument, considered so weighty by many, that in this way may be brought about a conservation of the fertilizing materials in the sewage by growing crops upon the land upon which it is treated. In a few instances these theoretical considerations have been borne out by practice but, as most of our readers are aware, the objections to sewage irrigation have been found to be so considerable in most cases that it is seldom used. Treatment on sand filter beds is common in New England and other localities where suitable sand is available at low cost, but even these are now found in few localities outside of New England.

It is therefore interesting to note (in a table to be published later) that in the state of California alone there are 47 municipalities, the sewage from which is used upon sewer farms and irrigated lands; this being more than half of all of the municipalities of the state which treat their sewage in any way. The reason for this general adoption in California (and in several of the far western states as well) of a system which is not practiced at all in the east is not far to seek. It lies in the fact that in those districts water is in demand for

irrigation purposes, and sewage is accepted and used as any other water would be, merely for its value for irrigation. Whether or not sewage effluents so used (all but nine of these municipalities use effluents from tanks of some kind for irrigating and not crude sewage) have any advantages over the ordinary unpolluted water for purposes of irrigation has not, so far as we know, been determined in most of these instances.

It is apparent therefore that these far western plants are not to be considered as offering any example or precedent for use, except in localities where water has a value for irrigating purposes equal to or greater than the cost of conducting the sewage to the irrigated areas and distributing it for such use.

Sewage Treatment Experiments.

In the great majority of plants devoted to experimenting in the treatment of sewage, if not in all such plants, the sewage used in the experiments is drawn from a sewer in regular service, frequently an outlet sewer, with the idea of making the test upon the actual sewage which is to be treated by the proposed plant. This idea is, of course, the correct one; but we fear the fact is too often overlooked that the sewage so obtained differs in many respects from that which will be delivered to the working disposal plant. The principal reason for the difference lies in the fact that the sewage used in the tests is ordinarily withdrawn from the sewer by a pump, the bottom end of the suction of which is provided with a strainer. The effect of this strainer is to exclude all except the more finely divided of the suspended matter. It is well known that a large part of the suspended matter of sewage is either lighter or heavier than water, and consequently either floats upon the surface or rolls along the bottom of the sewer. The suction, however, must be placed below the surface of the sewage, and must also be kept above the bottom of the sewer to permit free entrance of the sewage. Thus the floating matters and the heavier matters are very largely eliminated from the sewage tested. Moreover, such matter as rags, paper, leaves, etc., collect around the strainer and tend to further strain out even the submerged suspended matter. For this reason, the sewage which is treated in the experimental plant is generally lacking in fatty and other floating sewage matters which ordinarily collect in a scum on the surface of sedimentation tanks; and is also somewhat, and in many cases considerably, weaker in organic matter than the actual sewage as it flows in the sewer and as it would reach the purification plant in actual service.

The effect of this difference can readily be realized by any one who has had experience in the operating of sewage purification plants. Many of the difficulties experienced in such plants are due to the large amounts of floating matters, to silty sediment and to paper, rags, etc., which stop up openings, catch on weirs, clog up irrigation and filter surfaces, escape at intervals into and clog sprinkling filter nozzles, etc. Even the experimental plants whose results have been most widely published and used as basis of design have conducted their experiments on a sewage thus modified from the real crude sewage as it reaches treatment plants, this being true of the experiments of the Massachusetts State Board of Health as well as of practically all others.

This difference between experimental sewage and that which flows in the sewer is perhaps even more important in connection with sewage disinfecting operations than with other methods of sewage treatment. The reason for this is alluded to by Mr. Daniels in his article this week. Experiments widely published and

used as a basis of most of the disinfecting plants so far put into service were made upon a sewage which was called "crude sewage," and has too often been accepted by engineers as being equivalent to their own crude sewages. These engineers have generally overlooked the fact that, while the sewage which they expect to treat is frequently that of a small town which has consequently flowed but a small distance and is therefore comparatively fresh and with the suspended matters only slightly desiccated, the experiments were made upon comparatively old sewage and which was drawn through a more or less clogged strainer, and therefore contained practically no suspended matter except what had already been finely divided and reduced to the condition of either colloids or very minute suspended matter. Moreover, in carrying out his tests, Professor Phelps secured a thorough intermingling of the hypochlorite with the sewage for a period of two hours or more. The difference between his experiments, therefore, and the practice of dumping hypochlorite into crude sewage which contains considerable quantities of large particles of excreta and other suspended matter and where the mixing of the hypochlorite and the sewage, if any, does not occupy more than one or two minutes, is considerable enough to make a difference between success and total failure.

It would seem to be self-evident on the slightest consideration that bacteria cannot be destroyed by hypochlorite unless the hypochlorite reaches them. Bacteria embedded in a mass of organic matter are as safe and unaffected by hypochlorite as though it had not been applied, unless this organic matter be thoroughly broken up and the bacteria and hypochlorite be brought into contact. Even assuming the absence of any large particles of matter, the amount of hypochlorite used is so small compared with the amount of sewage that a thorough mixing of the two for several minutes at least would be necessary to insure the action of the disinfecting agent upon all the contained bacteria.

The subject seems to us to be important enough to call for a change in the ordinary methods of operating sewage treatment experimental plants. The method adopted in Baltimore of taking a small district and treating all the sewage from this district is, it seems to us, the only method of carrying on these experiments which is not likely to lead to unwarranted conclusions and later disappointments in the operation of large plants based upon these experiments. It is true that the sewage used from only a small area of a few blocks would reach the plant in a very fresh condition and that the treatment of this would probably be more difficult than that of the sewage of the entire city, which would be older and with the suspended matter more broken up. The difference, however, is on the side of safety rather than of over-confidence, and it should not be difficult to age and desiccate the sewage as a preliminary to further treatment, if this seemed desirable.

POMONA SEWER FARM.

The municipal sewer farm of Pomona, California, is a profitable undertaking for the city, according to a recent statement from street commissioner E. Baker. All of the horses used in the city street work can be fed from the barley and oat crop, which is unusually heavy this year. There are sixty-five acres sown to oats and thirty-five acres of barley. From the hundred acres a crop of 150 tons will be taken, according to the estimate.

As soon as thirty acres of hay have been harvested, the area will be plowed and planted to corn, as such rotation of crops is advantageous and results in two good yields in a single year.

The farm also grows walnuts, and a frequent shipment of hogs is marketed. At present there are about fifty on the place.

TESTING GRANITE PAVING BLOCKS.

July 10, 1914.

Editor, The Municipal Journal,
50 Union Square, New York, N. Y.

Dear Sir:

Apropos of the discussion going on in your columns since April, the last installment of which, under the head of "Granite Blocks and Toughness," was a letter of H. W. Durham, chief engineer of the Manhattan Bureau of Highways, published in the Municipal Journal for July 9, 1914, pages 39 and 40, permit me to invite your attention to certain conclusions reached by the writer in connection with his experience in Maryland and elsewhere.

Summed up, they may be stated as follows:

That tests of stone paving block for hardness and for toughness, made as referred to, are of but little, if any, value in determining the suitability of blocks offered for use.

That the tests for compressive strength are of little, if any, value so long as the dimensions of the block do not fall below those of the 4-inch approximate cube, and begin to be of value as the depth of the block does fall below 4 inches.

That satisfactory tests of the individual blocks themselves are difficult to make and are unreliable, and that better indications of the suitability of the blocks will be had by testing the material of which the blocks are made, or are proposed to be made.

Therefore the established practice of the writer has been to secure samples of the materials from which the blocks are to be made, or to break up the blocks themselves so that the material is obtained in sizes suitable for making the tests by the ordinary "Deval" or rattler test, such as is used for macadam material, and to test this material in the rattler; requiring for acceptability a loss between a minimum and a maximum, which minimum and maximum (ordinarily varying from 8 to 15) are established in accordance with the peculiar conditions in any case.

If this method of determining the suitability of stone paving blocks is followed, it is believed that "turtling," as well as excessive wear under traffic, may be avoided; though, of course, as Mr. Durham says in effect, much depends in any case upon the suitability of the joints secured. Where the traffic conditions permit of the use of a stone showing a low co-efficiency of wear under the Deval test, it would seem that wider joints can be satisfactorily permitted, especially if they are properly filled, than in the case where traffic conditions require, in order to prevent excessive wear, the use of a stone showing a higher co-efficient of wear, even though the joints in the latter case are filled in the best manner possible. Should the traffic be of the heaviest type, it is not to be deduced that the blocks composed of stone with the highest co-efficient of wear will give the greatest satisfaction in the long run, even though the joints are very close, because in that case, and even with the joints filled in the best possible manner with hydraulic cement, the inevitable "turtling" of the blocks, due to the latter being more resistant in the center than at the edges, or even than the joint filler itself, may be less satisfactory than a faster but more uniform wear of the blocks from material with a lower co-efficient.

The writer has referred to this matter publicly on several occasions before this, and as far back as 1908 prepared specifications for the State Roads Commission of Maryland, calling for a test of stone paving blocks by the rattler method as above referred to. He believes that the rattler test of the materials composing the blocks is simpler, more reliable, and more satisfactory than the combination of the other tests referred to.

Very truly yours,
W. W. CROSBY.

A MUNICIPAL "MOVIE."

A municipal moving picture theater, to which an admission fee of ten cents is charged, pays all the expenses of the water plant (no charge being made for water) and a large percentage of the municipal expenses of Haven, Kan. The city built the theatre, but since it could not legally be managed by the city, a local commercial club was formed to take over the management.

The WEEK'S NEWS

Ohio Road Work—The Rat War Progresses—New Jersey Municipalities Plan to Join Water Systems—The Problem of Summer Water Waste—Water Rate Fixing—Springfield Gas Co. Investigation—California Water Power—Manchester (N. H.) Fire—City Manager and Commission Form—New Recreation Pier for Baltimore.

ROADS AND PAVEMENTS

\$1,000,000 Road Contracts in Ohio.

Columbus, O.—Nearly \$1,000,000 worth of highway construction work was offered by State Highway Commissioner James R. Marker last week. No one contract calls for over five miles of construction. In the list offered twenty-two counties in the State were represented with one or more roads. There were thirty-seven separate contracts. As was predicted by the highway commissioner at the previous letting several weeks ago, the expensive character of construction was lessened. However, brick and concrete had a goodly representation in the allotment. The total mileage in the list is figured at 68.18, divided as follows: Brick, 24 miles; concrete, 15.43 miles, and macadam, 28.70 miles. It is very likely that macadam roads will be much in the majority the balance of the season for the reason that most of the brick and concrete roads will have been awarded.

Propose to License all Vehicles.

Baltimore, Md.—There is a growing sentiment that the State legislators, having committed themselves to the policy of raising funds for maintenance of the highways by the special taxation of licensing of motor vehicles, will make the laws apply to all road vehicles without discrimination. Funds aggregating more than \$130,000,000 a year could be raised for the construction and repair of highways if all vehicles were licensed under State laws on a basis proportionate to the use derived from and the wear and tear done to the roads, according to a recent estimate. Of this total, the 1,385,000 motor vehicles registered at fees from \$10 to \$25, would produce nearly \$19,000,000; the estimated 14,600,000 horse-drawn vehicles, at \$5 to \$20, would produce \$108,000,000, and the estimated 2,800,000 bicycles and motorcycles in use, at \$1 and \$3, respectively, would bring \$3,400,000.

Concrete Paving for Delavan, Ill.

Delavan, Ill.—One of the biggest concrete paving jobs ever started in central Illinois is now in progress in the town of Delavan. Twenty-two blocks of pavements will be constructed this summer. The work was started one month ago and will be completed before fall. A large gang of men is being rushed with that end in view. The concrete curb has been constructed on the streets which will be paved, and the mixture is now being poured on the street running west from the business district. Expansion joints will be placed every twenty-five feet.

Lebanon to Try Calcium Chloride.

Lebanon, Pa.—Calcium chloride is being laid as a test by the Semet-Solway Co. of Syracuse, N. Y., on some sections of the streets. The residents are paying for the material according to their frontage. Councilmen George F. Krause and E. U. Sowers, who proposed the plan, hope that the calcium chloride will be effectual in keeping Lebanon streets dustless.

Municipal Paving Plant for Edmonton.

Edmonton, Alta.—Edmonton's newest municipally owned public utility is a paving plant, to be established at a cost of \$25,000. It is planned to lay at least 100,000 square yards of paving before the close of the season. This will provide work throughout the summer and fall months for a large number of men now unemployed. The entire paving pro-

gram for this year involves a total expenditure of more than \$1,000,000, part of which will be financed by the Hudson's Bay Co. The city will pave several streets on the Hudson's Bay reserve, in the northern and eastern portion of the city, where more than \$3,000,000 worth of business and residence property was sold two years ago.

Prisoners on Road Work Strike.

Milton, N. J.—County Road Supervisor Seymour Pullis has had trouble during the last few days with prisoners who refused to work, on the ground that it was too hot to toil in the sun. When a gang of prisoners refused to lift pick or shovel, the supervisor had the obstinate ones chained to a steam roller and compelled them to keep walking behind the cumbersome machine. Some of them begged to be put back at their old work after plodding along behind the steam roller for a few hours, but others sullenly refused to give in.

Lincoln Highway in Ohio.

Columbus, O.—Of the 299 miles of Lincoln Highway through the State of Ohio there is yet eighty-four miles to be completed to make a solid stretch of improved roads through the State east and west. Of this eighty-four miles but twenty-seven miles will remain to be constructed after the cold weather sets in. The twenty-seven miles is off a market road and inter-county road and has to be assessed against the individual property holder.

SEWERAGE AND SANITATION

Six Die in Passaic Sewer Accident.

Bayonne, N. J.—Thirteen men were working 242 feet underground at the bottom of a seventeen-foot shaft sunk just outside the Jersey City line leading into the tunnel which the New York and New Jersey Construction Company is building in connection with the Passaic Valley Trunk Sewer, when without warning a section of rock about forty feet above the bottom suddenly split from the side of the wall. As it began to fall it broke into several pieces and the whole mass, weighing perhaps, about ten tons, fell among the laborers at the bottom of the shaft. Five of them escaped injury, but eight others were buried amid the mass of broken stones. Five men were crushed to death instantly and three were seriously injured, one dying later.

The Rat War in More Cities.

Galveston, Tex.—A mass meeting of the city, county, state and federal health officers was held in the office of Dr. H. O. Sappington, city commissioner, at which plans were made for a sanitary survey of the city, the bacteriological examination of rats at the city laboratory, instructions drawn for the use of ship captains, and changes made in the bounty offered by the city for rats. The tentative price on all rats delivered to the city health officer was placed at eight cents; five cents will be offered for dead rats and ten cents for live ones. The instructions for ship captains, including the regulations which have been prescribed by State Quarantine Officer Dr. I. L. McGlasson, will be distributed immediately by him to all ship agents and to all ship captains entering the port. The most important of the regulations are that no spring lines will be permitted to run from the ship to the wharves, that rat guards be installed on all vessels, and that the regulations be strictly enforced. All ships entering this port from New Orleans, Cuba or from Caribbean Islands or Central

American ports where cases of the plague have been reported, will not be permitted to discharge their cargoes until the cargoes have been fumigated and landed by lighters. The plans for the sanitary survey contemplate the blocking off of the city into sections, in each of which rat killers will operate, and all rats caught will be delivered to the state analyst, Dr. Lyon Heard, for bacteriological examination at the city laboratory. If any of the rats are found to be infected with the plague, extra efforts will be made to exterminate all the rodents in that section of the city. Those present at the meeting were: Dr. H. O. Sappington, city commissioner; Dr. Walter Kleberg, city health officer; Dr. Louis P. Behrenburg of the United States public health service; Maj. Rich, surgeon in charge of the United States medical department of the port of embarkation; Dr. I. L. McGlasson, state quarantine officer, and Dr. Even S. Cox, county health officer.

Springfield, Ill.—Extraordinary precautions against the possible introduction into this state of bubonic plague have been taken by the Illinois state board of health. Health officers along the Mississippi, Ohio, Wabash and Illinois rivers have been notified to start a war to exterminate rats. Particular attention is being paid to steamboats, wharf boats and freight houses of steamboat lines, and to freight houses and box cars of railroads entering the state of Illinois from the South, or connecting with roads which touch the infected city of New Orleans. The general managers of all railroads entering the state from the South have been asked to aid.

To Begin Work on Indianapolis Drain.

Indianapolis, Ind.—A contract with the Dunn-McCarthy Company, of Chicago, for the construction of the Pogues run drain has been signed by the board of public works. The work is to start within twenty-one days and is to be completed on or before July 1, 1916. The company has received four carloads of machinery and other equipment and expects to receive more within the next few days. It is possible that the work will be started with some little ceremony and that Mayor Bell will throw the first shovel of earth. The contract price is as follows: North section, \$190,953.64; middle section, \$383,054.52, and south section, \$347,959.15. The construction of the drain is necessary as a part of track elevation work in the central part of the city. All of the railroad companies interested have approved the contract.

Wants Cleaner Cars.

New York, N. Y.—In his campaign for better health in this city Health Commissioner Goldwater has been making an investigation of the condition of the cars of the subway, surface and elevated railroad lines. The condition of the cars, Dr. Goldwater finds, is one which should be looked into more closely, and he contemplated calling a meeting of the heads of the roads in the five boroughs with a view of paving the way for the adding of stronger sanitary provisions to the existing code. Dr. Goldwater is just now giving much attention to his plan for a physical examination of every member of his department. He holds that every person should be physically examined at least once every year. He intends to be examined himself as an example to the department, for the examinations are to be voluntary.

WATER SUPPLY

Court Allows Racine to Buy Water Works.

Racine, Wis.—The application of the Farmers' Loan & Trust Company of New York for an injunction, restraining the city of Racine from taking over the Racine water works, was denied in the federal court at Milwaukee. The city of Racine, the Racine Water Company and the state railroad commission were the three defendants named in the action brought by the trust company, and all of them had representatives at the hearing. City Attorney E. R. Burgess said that the decision meant that the city would go right ahead with the proceedings to gain possession of the water works. The railroad commission will set a date in the near future when the hearing to fix the final valuation, postponed when this action was started, will be taken

up. The trust company sought to restrain the purchase of the plant until some decision was arrived at in regard to \$1,200,000 or more worth of bonds which it held. It charged that the railroad commission had no right to hear the proceedings and that the corporation had no right to surrender its franchise and come under the public utilities act.

It was shown at the hearing that when the franchise was given, it was provided that the city could buy the plant after fifteen years or at any five-year period thereafter. The court ruled that the bonding company knew of this provision and waived its privileges of a trial by jury when it accepted it. In as much as no damage was done to the bonding company, the three judges could see no cause for granting an injunction. An appeal to the United States Supreme Court was granted. The suit is a test of the constitutionality of the indeterminate permit section of the Wisconsin utilities law, and the railroad rate commission was a party. The loan and trust company holds the bonds of the utility company.

To Decide on Joining Water Supplies.

Trenton, N. J.—In a resolution the State Water Supply Commission requested that Newark and the eight other municipalities which have made application for a joint water supply signify within sixty days whether they favor the acquisition of the properties of the East Jersey Water Company or the alternative plan of developing the watershed of the Wanaque River. The commission will hold a final conference with representatives from the nine interested municipalities at the city hall, Paterson, in September. The municipalities included are Newark, Paterson, Elizabeth, Montclair, East Orange, Totowa, Glen Ridge, Nutley and Passaic. The action of the commission was the outcome of a resolution recently adopted by the Board of Works of Newark urging that action be taken to provide an additional water supply for that city without further delay. It is understood that Newark is opposed to the purchase of the East Jersey Water Company plant, but is more than willing that the Wanaque watershed be constructed. It is further said that the attitude of the State commission is that Newark's need for more water is imperative and that should the other municipalities fail to come to some agreement by September 11, the State should enter into a contract with Newark and proceed with the Wanaque development. The resolutions adopted by the state commission review at length the negotiations between that body and the nine municipalities, including the authorization of the appraisal of the plant of the East Jersey Water Company.

Water Officials and Water Waste.

Brooklyn, N. Y.—Water Commissioner Williams is to begin a campaign against waste of water in Brooklyn, especially during the summer months, when a drought of a week's duration causes the water supply to fall below the normal average. The Board of Estimate received a request from Commissioner Williams, that \$10,083 be appropriated from the Brooklyn water revenues for 1914 to permit of the employment of twenty additional inspectors for a period of five months, beginning from July 15. It will be the particular duty of these inspectors to educate the public on the evil of wasting the city's drinking water and cause the arrest of chronic offenders.

Dover, Del.—At a meeting of the council a report on the air-lifts being used at the water works to secure more water for the town was made and it was shown that Dover's recent shortage of water was due in a great measure to the enormous amount of water wasted each day in all parts of the town. It was suggested that the price of pave washes be fixed according to the area feet rather than the frontage of the property as now paid by property owners.

Tacoma, Wash.—Because of what is termed the wilful waste of water the utmost capacity of the Green river system is being taxed during the evening hours of the day. During the last few days every drop of water coming down the new pipe line has been drained by the mains, whereas usually there are hundreds of thousands of gallons overflowing into Gallagher's gulch. As a result of these

conditions the water department issued a warning that users of water who sprinkle lawns must have nozzles on the hose or automatic sprinklers. If these are attached the water can be used 24 hours a day without complaint from the department, but the hose must not be used without a nozzle. Drastic action was promised by water department officials if the mandate is not lived up to.

Gloucester, N. J.—Chief Engineer Brandt, of the Water Department, claims that the use of water in Gloucester is excessive, the total for June having been 50,000,000 gallons.

Rapidly Metering Charleston.

Charleston, S. C.—Within the next eighteen months or two years, every water user in Charleston will have a meter service attached to his or her pipes, according to an announcement made by the Charleston Light and Water Company. The company states that the main object of introducing this system is the reduction of waste. In one day recently over 7,000,000 gallons of water, or over 1,300 gallons per capita, were pumped through the mains from Goose creek; this amount being estimated to be double the normal supply required, at an outside computation of per capita consumption. For the past two or three weeks the installation of water meters has been going on, and meters are now being installed at the rate of six a day. The force engaged in this work will be speeded up to ten a day soon, and it is figured that until July, 1916, will be required to provide the 5,200 customers of the water company with the meters, at a cost to the company of \$75,000. The water meter rates range from 25 cents per thousand gallons to seven and a half cents, according to the amount contracted for. If a consumer, under the meter rate, uses a hundred gallons of water a day, the monthly cost will be 75 cents, or \$9 a year, and so on. It is believed by the company that most of the small consumers will limit their water bills to a dollar a month, under this system. Now the average consumer pays about eighteen dollars a year, it is stated.

Test Big Pump.

Springfield, O.—Superintendent George B. Cotter, of the waterworks department, has submitted his official duty test report of the new twelve-and-a-half-million-gallon pump installed recently by the Allis-Chalmers Company, of Milwaukee, Wis. He shows that although the test was made on a basis of not less than 169,000,000-gallon foot pounds of work for each 1,000 pounds of dry steam supplied when the engine was operating under normal conditions, each of the timings taken exceeded the guarantee, the lowest being 173,570,000 gallons. The duty as finally figured in the report is 171,123,500-foot pounds per 1,000 pounds of saturated steam with 1.9 per cent. moisture in steam. The duty on dry steam of 100 per cent. quality is 174,528,125-foot pounds. The normal head is 207 feet, measured on the suction and discharge pipes close to the pumps. Superintendent Cotter recommends in the report that the city accept the engine. The engine is of the vertical expansion crank and fly-wheel type, having three single-action pumps of the direct fly-wheel type, equipped with automatic rubber valves. The unit is self-contained with the steam and supported by the pump chambers. The pump rests on a concrete foundation six feet thick, 30 feet long and 22 feet wide. The test was run under the supervision of Superintendent Cotter.

Injunction Restraints Rate Fixing.

Phoenix, Ariz.—An injunction has been served restraining the corporation commission from enforcing the order recently issued fixing water rates for the town of Miami. The papers were issued by Judge William H. Sawtelle, of the federal court, on application of Mrs. I. A. Van Dyke, owner of the water plant at Miami. The complaint filed in application for the injunction states that Ida A. Van Dyke owns the water system as an individual, not as a corporation, incorporated company or association of persons, and has been distributing the water for domestic, commercial and fire purposes. The contention is that the corporation commission has no power or authority to regulate the affairs of individuals, and is restricted to corporations and incorporated companies. The original complaint of the commission was filed under the provisions of Act 90, defining

a public service corporation and providing that a person within the purview of the act engaged in the distribution of water should be deemed to be a public service corporation. The commission then issued an order prescribing water rates for the town of Miami as charged by Ida A. Van Dyke, and denied an application for a stay of operation for sixty days, as requested by complainant.

Chlorine for Sacramento Water.

Sacramento, Cal.—Appliances are being constructed under the direction of City Health Officer Dr. Norman E. Williamson by which it will be possible to place chlorine in city water at the waterworks as a protection against typhoid. Dr. Williamson says that the application of chlorine is an emergency measure to be taken pending the installation of a filtration plant in Sacramento.

Fifty Per Cent. Reduction for Paying Water Bills.

Allentown, Pa.—City Treasurer Reichenbach, City Controller Hausman and Councilman Robert J. Wheeler have developed a strenuous plan for getting all water bills paid up quickly. A fifty per cent. discount was offered for payment up to a stated time and the three officials spared no energy in getting the citizens to take advantage of the offer. City Treasurer Reichenbach, his trained force of assistants and water department employes kept the telephone lines busy calling people and notifying them of their apparent oversight. Councilman Robert J. Wheeler, head of the water department, had his automobile out and where parties could not be reached by phone, calls were made at the homes. Up to 11:30 people were routed out of bed to be informed for the last time that fifty per cent. could be made. The outstanding bills will be charged at their full amount and stand as liens against the properties against which laid. Discount of one per cent. on the city tax bills will be allowed until August 1, after which all bills must be paid in full. The water tax duplicate this year was about \$5,000 in excess of any previous year.

STREET LIGHTING AND POWER

Investigating Springfield's Gas Company.

Springfield, Ill.—The report of the investigation of the Springfield Gas and Electric Company was filed with the State Public Utilities Commission by the city in its case against the company for lowest gas rates. Prof. E. W. Bemis, who was employed by the city some time ago to make an investigation of the company's property and report on what would be an equitable gas rate, was present at the meeting of the commission but did not take the stand. He is expected to testify later, drawing his deductions from the figures in the report. The report, which is a belated installment of the work for which the city paid about \$3,000 last year, covers a period from 1903 to 1912. It is admitted that nothing is charged off for depreciation, the adjustment having been left for another report. It is not likely that the case will be concluded for several months. The report shows that the Springfield Gas & Electric Company paid dividends from 1903 to 1912 totaling \$300,125. No dividends were paid in 1903, 1904, 1905. In 1906 and 1907 dividends were paid amounting to 6 per cent; in 1908 to 19.1 per cent; in 1909 to 24.5 per cent; in 1910 to 20 per cent; 1911, 27 per cent; 1912, 12 per cent. In 1913 a total of \$79,250 was paid out in dividends. The Springfield Gas Light Company and the Springfield Light, Heat and Power Company were merged into the Springfield Gas & Electric Company in 1913 and at that time the capital stock was increased \$1,225,000, according to the report. The company is now capitalized at \$3,000,000. The total valuation fixed by the report is \$6,108,254.40. The plant investment at the beginning of the fiscal year was \$5,516,600.70, which together with construction expenses totals \$5,525,015. The gas company had a surplus of \$21,235.83 on December 31, 1912, it is stated in one part of the report. Of this amount \$12,250 was used to meet a deficit in the electric department. Much detail is given as to earnings, equipment and value of tangible property from which the city experts hope to prove that the gas rate should be lower.

Big Water Power Developments in California.

San Francisco, Cal.—The State Water Commission has sanctioned the construction of water projects in California at a cost of approximately \$5,941,300, according to a report made by the commission covering the first two years of its existence. Thirty-eight applications to appropriate water have been filed with the commission since January 1, 1913, the report states. Twenty-one of these applications were rejected. The largest project to be constructed is that of the Yolo Water and Power Company on Cache creek and Clear Lake, to cost \$5,185,000. The application calls for the development of 49,000 horse-power. Another large project in the list is that of C. E. Loose for 10,429 horse-power, to cost \$422,301, at East Walker. The report states that a co-operative agreement has been entered into by the commission and the United States Geological Survey to assure harmonious action between the Federal and State Governments in applications for waterpower development.

Municipal Telephone in Dawson, Yukon.

Dawson, Yukon.—Dawson is planning to establish a municipal electric lighting and telephone plant, at an estimated cost of \$165,000. The Dawson Civic League, which is planning various improvements, recently petitioned the Yukon council against the annexation of the territory to British Columbia, and the surrender of its independence.

Ontario to Serve Power to Cities.

Toronto, Ont.—The most significant and far-reaching industrial movement in recent years in Ontario is that undertaken by the Province through its Hydroelectric Power Commission. In addition to the expenditure already made of \$5,915,725, the commission is authorized to spend \$5,000,000 during the current year in extending the work of furnishing electric energy at cost to municipalities for power and lighting. In addition to the 45 municipalities served last year, more than 100 others have asked for estimates for installing plants for the distribution of electric power to be obtained from the generating works at Niagara Falls and other places. By the end of last year 45 municipalities had installed electric power distributing plants at a total cost of \$8,469,197 (of which Toronto expended \$3,919,810); the total revenue derived therefrom was \$2,605,006 and the net surplus \$390,012. It is the policy of the municipalities to retain a part of the revenue as working capital. A compilation of the private electrical corporations in Ontario has been carefully made by the Canadian Electrical Association, Toronto, which is a branch of the

National Electrical Association of the United States. It has been found that the number of plants is 157 and the total capitalization approximately \$108,500,000, which includes the hydroelectric power plants at Niagara Falls. Estimates of cost were made for only a few plants having a capitalization of something more than \$1,000,000. Besides the works of the 157 companies there are some hydroelectric and other electric power and lighting plants owned by municipalities.

FIRE AND POLICE**\$400,000 Lost and Nineteen Firemen Injured in Manchester, N. H., Fire.**

Manchester, N. H.—More than twenty-four hours after the first alarm for the big fire in the John B. Varick Hardware Company's building had been turned in, the Manchester fire department was still pouring hundreds of gallons of water into the cellar of the ruins. More than 2,000 gallons of oil, paints, gasoline and varnishes were in the cellar when the fire started and the firemen were forced to sit by and await the burning out of the oil, meantime pouring enough water into the seething mixture to keep the remaining unburned woodwork from again catching. Fatigued from their long battle with the flames the firemen took a little respite in relays from their work and flung themselves on the pavements of the street during the night to sleep. The total loss conservatively estimated which was caused by the burning of the big store was set at \$400,000 by officials of the Varick Company and Thomas W. Lane, chief of the Manchester fire department. The fire was one of the most disastrous in the history of the city and was particularly hard to handle because of the very great dangers from explosives, stored in the building. Nineteen firemen were more or less injured from flying glass and falling bricks blown out by explosions. Many brave acts were performed by the firemen, scores of them standing over a veritable keg of powder fighting the flames for hours. Policemen and firemen carried a case of powder from the burning building down a ladder. For many minutes the firemen withstood a fusilade of bullets which fairly rained about them with the exploded shells when the fire reached that portion of the store where several thousand rounds of ammunition were stored. The presence of a new gasoline pumping motor propelled fire engine made by the Fore River Ship Co. of Quincy, Mass., in the city where it was to have given a demonstration, was most fortunate for the citizens of Manches-



Courtesy Manchester (N. H.) Union.

FIGHTING MANCHESTER'S DANGEROUS FIRE.

ter. This huge pumping machine got into action early in the conflagration and did much toward subduing the fire, which, but for it, many believe would have reached such magnitude that outside help must have been called for. The fire completely tied up the trolley service through the center of the city. The trolley wires were cut on either side of the fire zone and cars were requisitioned from Concord to serve the northern section of the city.

Propose a Fire Prevention Bureau in Pittsburgh.

Pittsburgh, Pa.—An ordinance for the creation of the division of fire prevention in the Department of Public Safety was introduced at a special meeting of council. It was affirmatively recommended at a meeting of the finance committee immediately afterward and it is expected to pass finally very soon. The fire underwriters have given an implied promise that the new division would result in a reduction of the fire insurance rates. The superintendent of the division would work directly under the Director of the Department of Public Safety. County Fire Marshal Thomas L. Pfarr, who is to be appointed to the place, met with the finance committee of council. In addition to the superintendent, whose salary would be \$2,400 a year, the ordinance provides for a clerk and stenographer at \$900 a year. The superintendent would inspect buildings and see that they and the premises surrounding them are in a condition to be as little as possible susceptible to fire. He would investigate all fires as to cause, loss and condition of premises before the fire, and answer all first alarms in the downtown section of the city and all second alarms in other sections.

MOTOR VEHICLES

Low Maintenance Cost of Bridgeport Police Autos.

Bridgeport, Conn.—To figure the average cost of operation per mile for each of the motor-driven vehicles in the police department, accurate reports are being kept of the number of miles traveled and the amount of oil and gasoline used. The first of those reports showed a remarkably low average. For May and June the average cost per mile for the patrol auto was three cents, while it was only two and a third cents per mile for the department touring car. Motorcycles are operated at the low average of a trifle more than five mills for each mile. The patrol traveled 933 miles on 187 gallons of gasoline and 28 quarts of oil at a cost of \$28.21. The touring car traveled 1,255 miles on 282 gallons of gasoline and 26 quarts of oil at a cost of \$29.26. The five motorcycles traveled 8,053 on 276 gallons of gasoline and 49 quarts of oil at a cost of \$43.59. Reports of this sort are to be kept every month and presented to the commissioners.

New Fire Truck Arrives.

Nashua, N. H.—The Seagrave Truck Company, Columbus, O., has delivered the city's new combination truck. The order was placed with the Seagrave Company by the fire commission about May 1, and it was their agreement in the contract that it would be built and shipped here within 90 days, which would bring the time up to about August 1, so that Chief C. H. Whitney was pleasantly surprised at its arrival. The new piece of motor-driven apparatus will be placed in the Central fire station.

Everett Receives Its New Combination.

Everett, Wash.—Everett's third piece of automobile fire equipment has arrived. The addition to the department's fire fighting apparatus is a 93-horsepower American-LaFrance machine with a guaranteed speed on level ground of from 50 to 60 miles. The machine is a triple combination pumper, being so arranged as to accommodate 1,200 feet of hose, forty gallons of chemicals, with carrying capacity for six men, carrying also the pump. The machine is larger and correspondingly heavier than the motor equipment now used by the fire department. The combination is able to pump 800 gallons of water with a pressure of 120 pounds on a 10-foot lift. The addition of the combination pumper means that five horses now used by the department will be sold and the money turned into the fund for the payment of the third piece of motor apparatus.

Motorizing Village Departments.

Long Branch, N. J.—Rumson and Oceanic gave a hearty welcome to their motor fire apparatus which arrived from the makers, James Boyd & Bro., of Philadelphia. The apparatus consists of two combination hose and chemicals for the two fire companies. Mayor Corlies and members of the governing body of Rumson took part in the welcome, as well as the firemen.

GOVERNMENT AND FINANCE

Seattle Defeats City Manager Plan.

Seattle, Wash.—By a vote of almost 2 to 1 the voters of Seattle rejected a new city charter prepared by fifteen freeholders chosen last March. The charter, which provided a city manager form of government, was opposed by the labor unions and most of the Socialists because it provided for a council of 30 members, elected by wards in place of the council of nine elected at large. The vote was light, less than 21,000 of the 75,000 registered voters going to the polls. Bond propositions for two bridges across the Lake Washington canal to cost \$830,000 carried, while propositions for three other bridges to cost \$930,000 were defeated.

Pueblo Keeps Commission Form.

Pueblo, Colo.—Pueblo's charter and form of municipal government will remain as it is as the result of a charter election in which a 3 to 1 majority swamped a proposed change which would have resulted in a return to the ward representative system with a mayor and all officials, except the chiefs of the fire and police departments, elective. The vote was 1,679 for the change and 5,219 against. The petition for the proposed amendment was signed by 2,060 people. Practically all of the voting was done in the residence sections and women played a prominent part in carrying the day for the supporters of the charter. Fully half of the votes cast in the residence districts were by women almost unanimously against the change.

Atlantic City's Commission Government.

Atlantic City.—"The tax rate has fallen from \$2.15 to \$1.87 under commission government," said Mayor William Riddle, declaring that the two years of commission government in Atlantic City which ended July 16 were a success. "We should have a change made to give the mayor a veto and require that it take the votes of the other four members to set it aside. As it is, the system invites the formation of a ring or minority and majority faction, and also injects more politics into the administration than would develop if the mayor was given the veto."

Bristol's Commission Government Successful.

Bristol, Tenn.—The commission form of government has closed its first year with \$15,000 on hand after the payment of all operating expenses and fixed charges. Previous to the inauguration of the new system the expenses of the city and its fixed charges exceeded the income. The \$15,000 surplus was applied to the purchase of that amount of the city's 6 per cent. bonds due in 1920.

New Charter for Portland, Ore.

Portland, Ore.—There is being drafted a new charter which will be offered to the voters of this city for their approval either at the general election in November or at the municipal election next May. The movement to draft a new charter started several weeks ago. The form of government provided under the new plan will be a combination of the former system and the present commission form. The council will be larger, it is said, and in all probability there will be a Board of Public Works to share in the executive functions. Instead of leaving the appointment of the municipal judge, city attorney and city treasurer in the hands of the commissioners, as at present, these officials will be chosen by the voters, thus robbing the commission of much of its present power. It is also planned to make the provisions of the proposed charter more specific than under the present system and incorporate as a part of the charter many of the ordinances under the present system, especially those which provide for street and sewer improvements which now can be changed by council.

Richmond Wins Annexation Proceedings.

Richmond, Va.—Judge Campbell has handed down his decision in the famous annexation case, in which the city has been asking for a good part of Henrico county and for a small portion of the county of Chesterfield. The decision favors the city in almost every contention, adding some sixteen square miles of territory and more than 18,000 population, census of 1910, to Richmond. It is believed that the city will add not less than 30,000 when a new census is taken. Real and personal property of more than \$12,000,000 is included in the plan of annexation. The county has given notice of an appeal from the decision, but the chances are that the case will end where it is. Ginter Park, a fashionable and exclusive suburb, is resisting the decision and will possibly unite in the appeal, if there is one. The county has served notice that it reserves the right to appeal. There have been many cases of annexation carried to the supreme court, and they have invariably been lost to the counties which have resisted the decrees of the courts which have heard the cases, and there is not an instance on record in which the trial courts have been reversed. In his decree in the case he has ordered that annexation shall become effective on and after September 1.

RAPID TRANSIT**Traction Company Wins in Kansas City, Mo.**

Kansas City, Mo.—Kansas City voted to extend the franchise of the Metropolitan Street Railway Company nineteen years by about 7,000. The vote was the heaviest ever cast in a special election here. The present franchise has eleven years to run, but the company asked the nineteen-year extension in order to re-finance. The Metropolitan has been in the hands of receivers three years. Under the terms of the new franchise a fare of 5 cents will be charged. The control of the Metropolitan will be vested in a board of directors composed of six representatives of the company and five of the city. The ordinance granting the franchise was drawn by Henry L. Jost, mayor, and the two receivers appointed by the federal court to take charge of the company property. It passed the city council before its submission to the voters. The new franchise will take effect immediately. Victory for the traction interests at the polls comes after a three-year struggle for an extension of franchises which will enable the committee to finance a reorganization of the Kansas City Railway and Light Company, the parent organization controlling the Metropolitan Company and subsidiaries. The Kansas City Railway and Light Company, a New Jersey corporation controlled by the Armour interests, will be reorganized at once under a plan similar to that now in effect in Chicago, under which the city and the traction companies share in the earnings. The receivers of all the Kansas City companies, the federal court which appointed them and the present Kansas City administration co-operated in the campaign for an extension of the franchises.

Urge Municipalization of Washington Street Lines.

Washington, D. C.—Unqualified endorsement of municipal ownership of street railways is voiced in the formal report of the district committee on the Crosser street railway bill, which has been filed with congress. The report unequivocally recommends the passage of the bill, which would authorize the District of Columbia to condemn and take over the street railways of Washington, at a valuation to be determined by a board of competent jurisdiction. The committee finds that the hearings on the bill, despite the voluminous testimony offered by street railway and public utility interests, developed no fundamental reasons why public utilities should be operated by private companies for private profit. On the other hand, the public nature of the service rendered, the necessity for occupation and use of the public streets, the opposition or private ownership to regulation which would produce service for the public instead of only profits for the company, and the corrupting influences through which private owners of public utilities seek to protect and extend their power, all contribute to the reasons why the public should own and operate its own utilities, it is held.

"The prime, and really the only motive in private owner-

ship," the report states, "is profits. The greater the profits, the more successful the business from the standpoint of the owners of the business."

"The greatest profit is derived by exacting the highest price the buyer will pay for service and giving the least service for which the purchaser will pay."

"In all ordinary kinds of business, the buyer is protected against the avarice of the seller by competition. This wholesome check, however, does not exist in the case of a street railway company."

"The natural tendency of persons desiring to operate a street railway is to induce the municipality to grant the right in the streets on such terms as would enable them to procure the greatest possible profit."

This tendency, the report states, has led to the corrupting of public officers, the election of persons to office who would be subservient to the corporations' demands and has made private ownership of public utilities a far more dangerous influence in politics than ever public ownership could become. Over-capitalization and false accounting are declared to be but two of the methods by which private utility companies have sought to obtain profits greater than allowed by law. The fifty-four injunction suits filed by the Cleveland Electric Railway company to obstruct the building of the original low fare line in Cleveland, and the fight put up by that company to declare the whole city government illegal, are cited as examples of the extremes to which private ownership of utilities will go against public welfare when the profits of the company are jeopardized. Advantages offered by public ownership, as pointed out by the report, include the removal of the potential influence to corruption; removal of the obstacle of private profits from the path of good and sufficient service; the return to the public of full control of its streets and the assurance—with private profits and high overhead expenses eliminated—that, with the same amount of traffic, the same service can be rendered at lower cost or a better service at the same cost.

City Advertises Public Safety.

Milwaukee, Wis.—The Public Safety Commission is using advertising in a campaign for public safety. The admonition which has appeared on the cars of the Milwaukee Electric Railway and Light Company for a week in the safety campaign is "Cross streets on crossings only." This is the eighth placard which has been shown in the street cars of the city through the commission.

Town Buys Trolley Road.

West Orange, N. J.—West Orange has become the first municipality in the state to own a railroad by the purchase of the Mountain Railway, which runs from Christopher street, Orange, to St. Cloud, West Orange. The road is two miles long. The company also holds the lease of the mile-and-a-half line up the mountain of the Orange Mountain Traction Company. The road was sold at auction on account of the failure of the company owning it to pay \$1,500 taxes on its personal property. The line is the only rival in this district of the Public Service Corporation. It formerly got its power from the Public Service Electric Company, but the power has been shut off on account of a bill which dates from the time the road was started six years ago. Town officials will make an effort to have Thomas A. Edison lend or rent one of his storage battery cars to the road. If this plan is not successful, Orange will be asked to help out by selling the line the surplus power from its municipal lighting plant. The rolling stock is two cars.

San Francisco's Municipal Railways.

San Francisco, Cal.—Estimating the receipts and expenses of the municipal railway for June, bookkeeper Leonard Leavy of the Board of Public Works, gives the following figures for the last twelve months for the Geary street road: Receipts: \$641,374.48; operating expenses, \$297,025.14; deduction of 18 per cent. of gross receipts for depreciation, \$115,447.41; interest on bonds sold, at 4½ per cent., \$88,605; accident liability insurance, \$3,866.18; net receipts for fiscal year, \$136,430.75. The receipts for June are estimated at \$56,149. For the Union street line, which the city has been operating since last December, Leavy makes the following statement, including an estimate for June: Receipts, \$189,535.37; expenses of operation, \$90,697.33; deduction for depreciation, bond interest, accident liability, \$45,545.61; net receipts, \$53,292.61, of which sum the Board of Supervisors has set aside \$48,971.20 to pay for Stockton street tunnel construction work.

MISCELLANEOUS

Baltimore's New Recreation Pier.

Baltimore, Md.—The recreation and commercial pier, the superstructure of which is about completed, will have the lower deck for commercial purposes and the upper deck for recreation. As the harbor widens out at this point, the pier was designed to allow a depth of water in docks of 35 feet when needed. At this time the depth is 27 feet, being ample for those vessels which will use it at the present time. The docks are 190 feet wide, with bulkheads on either side. The pier is 150 feet wide by 500 feet long, and for one-half its length is a solid type, the outer half being open construction. The driveway for the depth of building is 35 feet, widening out to 58 feet in width and paved with sheet asphalt. The outer half is paved for its full width. Later, after the fill has settled behind sheet piling, the balance of the pier will be paved. At the head of the pier is a building 145x86 feet, back of which the deck will be covered for a distance of 312 feet, with head room of 22 feet. On the first floor are located on either side of the main driveway, offices in connection with the commercial pier, harbor master, freight offices, etc., together with toilet rooms, boiler room, fuel room, etc. On the mezzanine, additional office space is provided and on the second floor will be the large assembly hall, with foyer and anterooms, toilet rooms, etc., for the use of the public. This large assembly hall, 40 feet in width and 84 feet in length, opens on to the spacious stairways and runways leading to the floor above. At the end of the recreation deck will be two large additional stairways for the public, leading to the main deck of the pier. The building is entirely of fire-proof construction, of steel frame with brick walls and stone and granite trimmings. While simple in design, it has a decorative effect in its mass and proportions, and will be a distinctive landmark among the public buildings of Baltimore. The work involved an expenditure of about \$1,000,000.00, taken from the 1961 \$2,000,000.00 dock loan, \$450,000.00 of which was for property. The pier will be used primarily for commercial purposes. The covering of the lower deck, forming the roof of that part of the pier to be used for storage purposes, was, at a small additional cost, made available for recreation purposes.

Applies for Extensive Crossing Abolition.

Paterson, N. J.—City Engineer H. J. Harder, of Paterson, has prepared for filing with the Finance Commission a detailed plan for the elimination of grade crossings on the Erie Railroad in Paterson, for which the city has an application pending before the State Board of Public Utility Commissioners. The report shows that the cost of elevating the tracks, exclusive of property damages and the Erie's additional maintenance expense during the progress of the work, is \$2,587,000.

LEGAL NEWS

A Summary and Notes of Recent Decisions—
Rulings of Interest to Municipalities

Building Contracts—Extras.

Millen v. City of Boston.—Where a contract for the erection of a school building for defendant city provided that the city might, by order in writing, change the plans, that the contractor in such case should within one week deliver to the architect copies of such order, but that no sum should be allowed on account of any such order, unless a copy was so delivered or the mayor should approve the same, a contractor cannot recover for extras, where no written order was given and the mayor did not approve.—Supreme Judicial Court of Massachusetts, 105 N. E. R. 453.

Acquisition of Electric Light Plant—Statutory Provisions.

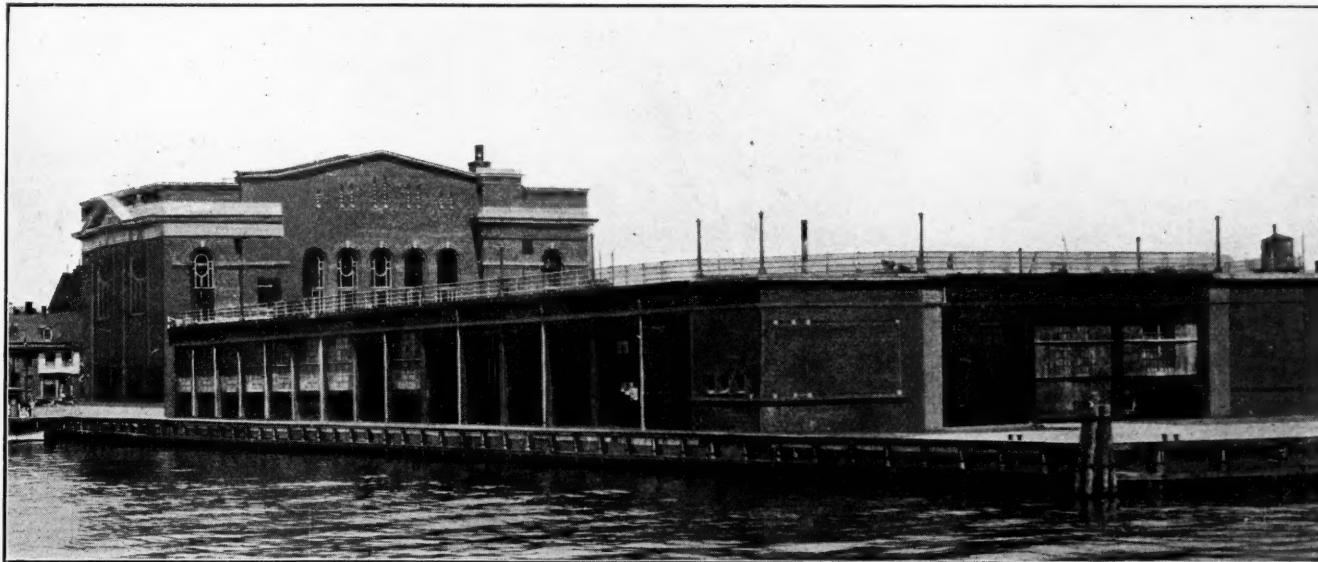
Cooper v. Town of Middleton, et al.—Where the board of trustees of a town determined by resolution to build an electric light plant and issue bonds therefor, and submitted the question to the voters, and the election was in favor of building the plant and issuing bonds, the act of the board in purchasing poles, wire and equipment at an expense in excess of the bond issue, and contracting with another for the purchase of electric current to light the town, was unauthorized and a diversion of the proceeds of the bonds, and would be enjoined at the suit of a citizen and taxpayer.—Appellate Court of Indiana, 105 N. E. R. 393.

Bonds—Validity—Issuance.

Le Roy v. Elizabeth City.—Where the statute authorizing a municipality to issue bonds for the erection of a market house required them to be sold at par for which price they had been sold, payment of the reasonable expenses incurred in issuing the bonds was not such a misappropriation of the proceeds as to invalidate the bonds. Where a statute authorizing a municipality to issue bonds for the erection of a market house did not require the unanimous consent of the board of aldermen, and there was no such requirement in the charter, the bonds may be issued upon approval by a majority of a quorum.—Supreme Court of North Carolina, 81 N. E. R. 1072.

Police—Salary—Right to.

People ex rel. Baran v. Waldo, Police Com'r.—Salary is an incident to office, and hence a policeman reinstated upon certiorari brought to hearing a year after removal is entitled to salary, though the city, during the interim had no benefit of his services.—Supreme Court, Appellate Division, 147 N. Y. 848.



Courtesy Baltimore (Md.) Municipal Journal.

BALTIMORE'S NEW RECREATION AND SHIPPING PIER.

NEWS OF THE SOCIETIES

Calendar of Meetings.

July 21-23. LEAGUE OF WISCONSIN MUNICIPALITIES.—Annual Convention, Madison, Wis. President, Joseph Fisher, Madison. July 24-25. TRI-STATE PACIFIC COAST GOOD ROADS ASSOCIATION.—Annual Convention, Medford, Ore. George E. Boos, Secretary, Medford. Aug. 5-7. COUNTY COMMISSIONERS OF PENNSYLVANIA.—Annual Convention, Erie, Pa. T. W. Waterhouse, Chairman Local Committee. Aug. 10-12. MONTANA GOOD ROADS CONGRESS.—5th Annual Convention, Great Falls, Mont. Secretary, Walter S. Clark, Great Falls. Aug. 10-15. MASSACHUSETTS STATE PERMANENT FIREMEN'S ASSOCIATION.—Annual Convention, Lynn, Mass. Aug. 18, 19, 20. FIREMEN'S ASSOCIATION OF THE STATE OF NEW YORK.—Geneva, N. Y. Sept. 9-11. NEW ENGLAND WATER WORKS ASSOCIATION.—Annual Convention, Boston, Mass. Secretary, Willard Kent, Narragansett Pier, R. I. Sept. 15-18. INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.—Annual Convention, Atlantic City, N. J. Secretary, C. W. Pyke, Electrical Bureau, Philadelphia, Pa. Sept. 20-23. INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—Annual Convention, Grunewald Hotel, New Orleans, La. Secretary, Mr. McFall, Roanoke, Va. Sept. 21-25. ILLUMINATING ENGINEERING SOCIETY.—Eighth Annual Convention, Cleveland, Ohio. Assistant Secretary, Joseph Langan, 29 West 39th street, New York City. Oct. 6-9. AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—Annual Convention, Boston, Mass. Secretary, Charles Carroll Brown, Indianapolis, Ind. Oct. 21-23. ALABAMA GOOD ROADS ASSOCIATION.—Nineteenth Annual Convention, Montgomery, Ala. Secretary, J. A. Rountree, 1021 Brown Marx Bldg., Birmingham, Ala. Oct. 28-31. NORTHWESTERN ROADS CONGRESS.—Milwaukee, Wis. Secretary, J. P. Keenan, Milwaukee. Nov. 9-13. AMERICAN HIGHWAY ASSOCIATION.—Fourth American Road Congress, Atlanta, Ga. Secretary, J. S. Pennypacker, Colorado Building, Washington, D. C. Nov. 18-20. WASHINGTON STATE GOOD ROADS ASSOCIATION.—Spokane, Wash. Secretary, M. D. Lechey, Alaska Building, Seattle, Wash. Dec. 14-17. AMERICAN ROAD BUILDERS' ASSOCIATION.—11th Annual Convention; 5th Annual Good Roads Congress, and 6th Annual Exhibition of Machinery and Materials, International Amphitheatre, Chicago, Ill. Secretary, E. L. Powers, 150 Nassau st., New York, N. Y.

Illuminating Engineering Society.

The first meeting of the committee chairmen, who will conduct the convention affairs for the next annual convention of the I. E. S. to be held in Cleveland from September 21 to 25 inclusive, was held at Hotel Statler, Cleveland, Ohio, on June 17, when the general chairman gave a luncheon to the various committee chairmen appointed.

Those present at this meeting included.

Mr. W. M. Skiff, chairman, National Lamp Works, Cleveland.

Mr. A. J. Brown, secretary, National Lamp Works, Cleveland.

Mr. H. B. Dates, chairman attendance committee, Case School of Applied Science.

S. G. Hibben, Pittsburgh Section Macbeth Evans Glass Co., Pittsburgh, Pa.

H. N. Sibbald, master of transportation, National Lamp Works, Cleveland.

A. G. Summerell, chairman hotel committee, National Carbon Co., Cleveland.

The meeting was an enthusiastic one and plans were discussed for the handing of details connected with each separate committee and the chairmen's duties clearly outlined.

Each committee chairman was asked to appoint as many other members on his committee as he deemed proper, and it was suggested and agreed to, that a meeting of each of the various committees was to be called and work assigned each committeeman.

American Society for Testing Materials.

The society held its seventeenth annual meeting at Atlantic City, N. J., June 30 to July 3, with an attendance that surpassed all previous conventions. An increase in membership, aggregating 113 for the year, brings the total number up to 1,687.

There has been a marked growth of committees, one having 108 members and another 67. Three new committees were created: A committee on concrete and concrete aggregates, another on shipping containers and a third on refractory materials.

The proposed revision of the by-laws was unanimously adopted.

The program of the sessions were completely carried out as previously announced.

For the ensuing year the following officers were elected: President, A. W. Gibbs; vice-president, A. A. Stevenson; secretary-treasurer, Edgar Marburg; members of executive committee, Robert Job, F. W. Kelley, A. Marston and S. S. Voorhees.

American Institute of Electrical Engineers.

On June 22 to 26, the thirty-first annual convention of the American Institute of Electrical Engineers was held at Hotel Pontchartrain in Detroit.

President C. O. Mailloux delivered an address in which he spoke of the broad duties of an engineer to society. A discussion by Mr. Rushman, of Schenectady, followed.

Several of the papers read were: "Data Relating to High-Tension Transmission Systems," prepared by Mr. Thomas; "The Present Status of Prime Movers," by Messrs. W. S. Gorssuch and R. I. S. Pigott, of the Interborough Rapid Transit Co. of New York; "Voltage Tests of Cables," by W. I. Middleton, of the Simplex Wire & Cable Co., of Cambridge, Mass., and the "Sterilization of Water by Ultra Violet Rays," by Mr. Von Rechlinghausen, director of the Westinghouse Cooper-Hewitt Co., Paris, France.

The attendance at the convention was nearly 500.

American Electric Railway Engineering Ass'n.

The Engineering Manual, published by the American Electric Railway Engineering Association, is now being distributed. This publication is a compilation of the standards and recommendations adopted by this association and covers practically the entire field of electric railway engineering. The book is in loose leaf form, and consists of 82 sections, fully illustrated with diagrams and working drawings. The loose leaf form of the manual has been adopted in order that the standards and recommendations may keep pace with such additions and alterations as are made at the yearly conventions of the associations. Separate sections may be obtained. The price of the manual to non-members of the association is \$3, binders \$1 extra.

Members of the association receive the manual (without the binder) free.

Lt. Col. H. N. Ruttan has announced that he has retired from the city engineer and has been appointed consulting engineer to the city of Winnipeg, Man. He will continue the general practice of his profession as consulting engineer at 802 Confederation Life Building, Winnipeg, Man.

Municipal League of Indiana.

The twenty-fourth annual convention of the League was held at Columbus, Ind., July 7, 8 and 9. The towns of Martinsville and Garrett were admitted to membership.

The programme as previously announced in Municipal Journal was substantially carried out, and in cases where authors of papers were unable to attend, their addresses were read by others.

For entertainment there was a band concert and a reception tendered by the local Commercial Club.

Logansport was selected as the convention city for 1915 and the following officers were elected: Dr. E. C. Loehr, mayor of Noblesville, president; H. Karl Volland, mayor of Columbus, first vice-president; Dr. Oliver C. Gard, mayor of Frankfort, second vice-president; J. W. McCarty, mayor of Washington, third vice-president; Martin T. Kreuger, mayor of Michigan City, fourth vice-president; C. M. Custer, city controller of Logansport, secretary; E. T. McMahon, city controller of Richmond, treasurer.

State Firemen's Association of South Carolina.

The association during its three-day convention, beginning June 21, had many spectacular contests and interesting parades and several instructive addresses at Florence.

Greenwood will be the 1915 convention city. The following officers were elected:

Louis Behrens, Charleston, president; O. C. Laroque, Marion, first vice-president; E. J. Wells, Newberry, second vice-president; R. S. Hood, Sumter, secretary; T. O. S. Dibble, Orangeburg, treasurer; C. J. Levy, Georgetown, statistician.

NEW APPLIANCES

THE MONAHAN BACKFILLING MACHINE.

A New 10 h. p. Machine With 24 Foot Range and a $\frac{1}{2}$ cu. yd. Backfilling Bucket.

The new Monahan backfiller consists of a 10 h. p. engine and boiler mounted to provide both self-propulsion and hoisting power and a track-way transverse to the direction of traction designed to carry a moving scraper or bucket. The bucket track is made up of two Z-bars 18 inches apart and 24 feet long, and along these runs the bucket on 8-inch wheels with 2-inch flanges. The bucket is so rollered that the horizontal thrust and the up-thrust are taken up. On the carriage plate are two angles—one to carry the backplate of the bucket and the other to hold a pulling rail which extends across the front of the bucket. The bottom of the bucket consists of an apron 18 inches long by 24 inches wide, the tilt of this apron determining the depth of spoil to be left on the ground, and being controlled by a chain attached to hooks over the pulling rail. Since the bucket can move only horizontally it works always at the bottom of the spoil. The traction wheels of the rig move on the left of the trench and the tilt of the apron can give any slope desired to the spoil bank. If the bank shifts to the other side while the direction remains the same, the rear plate of the bucket is simply unbolted and turned end for end.

The bucket has a capacity of half a cubic yard and can make an average of fifteen strokes a minute. It is controlled by a wire rope passing over four 12-inch sheaves on the drum of the hoisting engine, the ends of the rope being fastened to the back of the bucket and to the pulling rail. The range of the bucket and the reversing of the engine are automatically controlled by trips placed on a bar running halfway between the tracks.

This backfilling machine was invented by Frank J. Monahan, a sewer contractor of Joliet, Ill., who also invented the Monahan trench excavator. It is manufactured by William Heggie, of Joliet.



IMPELLER FOR SEWAGE PUMPING.

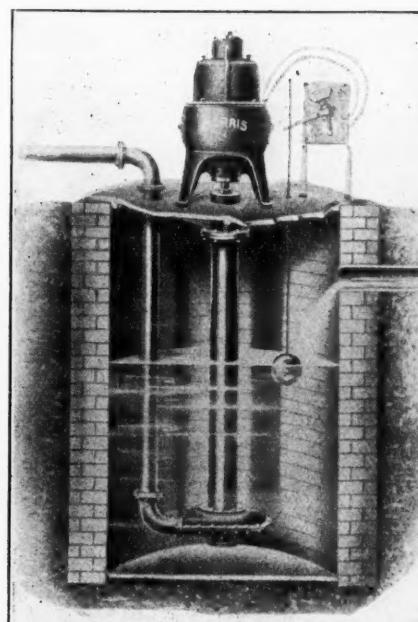
CENTRIFUGAL PUMPS FOR SEWAGE.

Morris Vertical and Sump Pumps of Various Types for Handling Sewage.

The Morris Machine Works, Baldwinsville, N. Y., manufacture a complete line of centrifugal pumps, the design of which make them especially adapted to the handling of sewage. While frequently used by contractors



SUCTION AND SUBMERGED TYPES OF VERTICAL PUMPS.



MORRIS SUMP PUMP.

on excavation and other deep work, the nature of sewage pumping, where the pump may have to be submerged, makes the vertical pump a convenient one. The vertical pump is always primed and, therefore, can be used in isolated places without danger of losing priming. This pump may be placed in a well in such a position that the water in rising will submerge and prime the pump which continues in service until the level has been pumped as far as desired when the pump automatically stops—starting again after the water rises above the pump. The vertical shaft pumps may be placed either submerged in the water or may operate with a suction lift. The pumps may be used with any drive—belt, steam engine, turbine or electric—but vertical shaft electric motor is generally used in sewage work. These pumps are furnished either single or in stages. An open impeller is used in sewage pumping.

The Morris Sump Pump is used for any service where drainage accumulations are to be pumped from a pit or sump. This pump is self-contained and is suspended from a cover plate which fits over the top of the sump and is, therefore, easily removed. Being submerged it is always primed and ready to start. By means of an automatic float switch starter the pump is automatically started when the pump is full and again stopped when emptied. The sump pumps are built in sizes from one inch discharge upward.

A MOTOR PICK-UP SWEEPER.

The Elgin Street Sweeper, a Three-Wheel Auto Carrying Broom, Sprinkler and Elevator.

The Elgin Street Sweeper Co., Elgin, Ill., is making an automobile pick-up street sweeper. The Elgin sweeper travels at four miles per hour and will sprinkle and sweep an 8-foot strip—or about 18,000 square yards per hour. The sweepings are elevated into the carrier holding about three cubic yards from whence they may be dumped.

The sweeper is carried on three wheels—giving a three-point suspension and short-turning radius. The hopper is carried forward over the main axle between the two driving

wheels and is provided with a dump bottom. The elevator carrying the sweepings from the broom is hung from the top of the carrier and its lower end is carried by two small wheels equipped with coil springs. Following the elevator and just preceding the broom is a series of shoes which follow the surface of the street and over which the broom brushes the sweepings. The water is carried in a 200-gallon steel tank from which it is sprayed through a series of atomizers under a pressure of 60 pounds per square inch. The broom is 30 inches in diameter and made of bass fibre, cemented over solid core. The official records of the machine in Elgin, Ill., and Boise, Idaho, show good economy

Carl E. Plum, foreman of streets reported to the Commissioners of Elgin that during September, 1913, the machine gathered about 20 cubic yards per day, sweeping 17,000 sq. yds. per hour at a cost of \$4.35 per day, or about 4 cents per 1,000 sq. yds. Using this machine about eight months, or 208 working days during the year, paying the driver \$75 per month, four men for gutter cleaning at \$40 per month, a team for hauling refuse at \$5 per day, and four patrolmen to work in the downtown section during the day at \$40 each makes a total cost of \$5,190. Comparing this with the cost of two teamsters at \$50 per month, two men at \$45, fourteen men at \$40, one single wagon for eight months at \$75, the maintenance cost, including that of the teams, would be \$9,840. The saving would thus be \$4,650 a year.

J. M. Sharp, Street Department, reported to the Council of Boise on the work of the sweeper during May, 1914. Working two seven-hour shifts a day the machine swept 269,681 sq. yds. per day, twenty days, and 316,582 sq. yds.



THE MONAHAN BACK FILLING MACHINE AT WORK.

of operation. The sweeper and all the mechanism is driven by a four-cylinder motor from which the power is transmitted from the motor through a cone clutch to the sliding gear transmission which has three forward speeds and one reverse. There is an auxiliary shaft with a friction clutch for automatically bringing the broom and elevator into operation when the broom is lowered into sweeping position. The sweeper is operated by one man who controls the whole machine, the water pressure, broom and elevator.

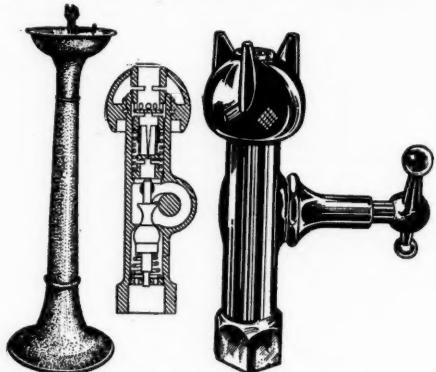
per day, four days, making a total of 6,472,344 sq. yds. in twenty-four days. The cost of sweeping this yardage was: 2 drivers at \$3 per day.....\$144.00 1 pick-up team at \$4.50 per day.. 108.00 1 gutter man at \$2.50 per day.... 60.00 290 gals. gasoline at 21c..... 60.90 21 1/4 gals. oil at 43c..... 9.14

\$382.04
The cost of sweeping was therefore 5.9c. per 1,000 sq. yds. With horse sweepers this yardage would cost \$45 per day, or \$1,080 for the 24 days.

These figures indicate that with this sweeper a street one mile long and 32 feet between curbs may be swept in about 1 1/4 hours at a cost of 75 cents.

SANITARY BUBBLE FOUNTAIN.

The Eastern Fountain Company of Boston, Mass., has placed on the market a new line of bubble fountains which they claim to be economical of water, easy to operate and not readily gotten out of order. The regulation

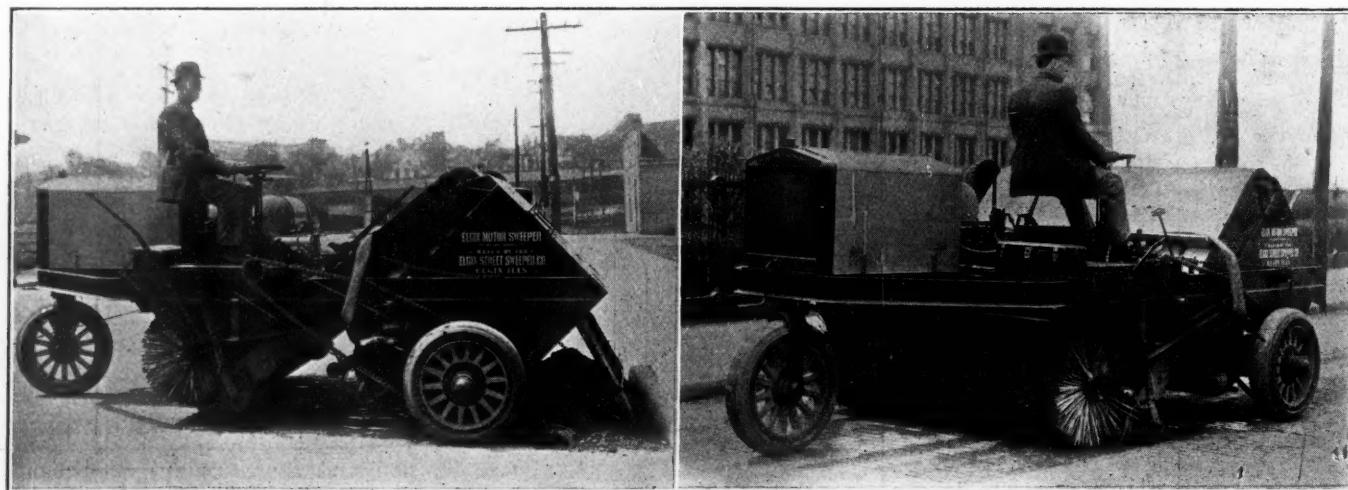


STANDARD AND FOUNTAIN.

of the Eastern fountain, known as the "Factmill," is said to be such as to give perfect control over a wide range of pressures—from 15 pounds to 125 pounds—with always a two inch height to the bubble. When the water is turned on, the bubble forms immediately and shuts off instantly when released.

As shown in the illustration the "Factmill" combines in one piece only five inches high, a nozzle, regulator and quick acting valve. Simple and neat in design, it has all of its working parts encased. To prevent clogging by scale of either the valve or regulator, a screen is provided which is so placed as to be cleaned easily. Guards are placed on the "Factmill," on account of children and ignorant persons, which, together with the generous two inch bubble, insure ample protection. Fountains of suitable design for outdoor municipal purposes, supplied by this firm can be readily fitted with the "Factmill."

Among the many municipalities which have already installed the "Factmill" fountains are Boston, Lynn, Springfield and Worcester, Mass., Providence and Westerly, R. I., Hartford, Waterbury and Britain, Conn., and other New England towns.

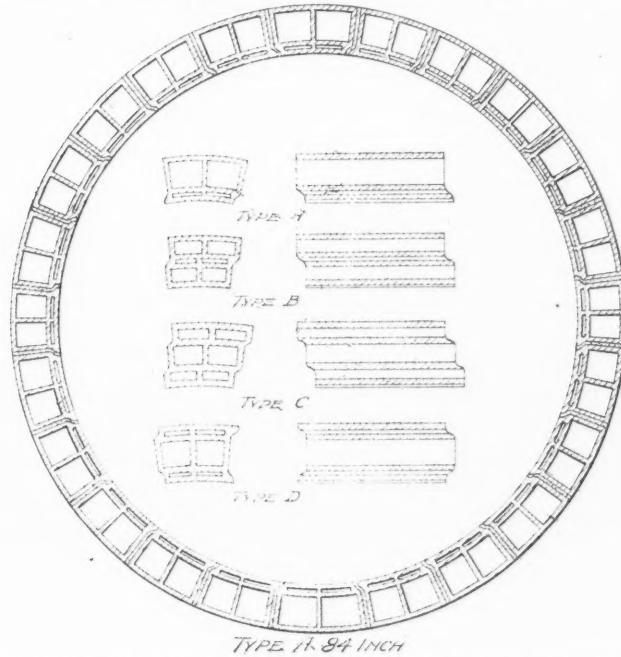


THE ELGIN MOTOR SWEEPER DUMPING AND SWEEPING.

SEGMENT HOLLOW BLOCK SEWER CONSTRUCTION.

Lapped Joint Type of Construction—End and Side Joints.

The Campfield Raggie Block Company of Richmond, Ind., makers of raggie blocks, air-cell flue lining, air-cell underground conduit and other clay products, have recently been granted patents on segmental sewer tiles. These refer to segmental sewers built up of hollow tiles which form lapped joints at the end and the side. These joints are of two types—the ogee and the square joints. From the illustration it will be seen that the tiles are made in four types differing in the



SECTION OF CAMPFIELD BLOCK SEWER AND BLOCKS.

number, position and size of the air-cells and in the joint projections. The joining at the end is calculated to give longitudinal strength. The construction with this block is somewhat unique in that the key block can be placed from the top without sliding it endwise into position. These blocks have all the advantages of the segmental block type of construction: the tile is easier and cheaper to lay since it is a larger unit than brick; the inside surface is smooth and sanitary; it can be used for building sewers larger than thirty-six inches at which vitrified pipe is limited.

The same company has also just been awarded a patent for an underground conduit for steam pipes. The Campfield Air Cell Conduit utilizes the thermos temperature insulation properties of the air-cell. It is designed for the protection of hot or cold pipes conveying any fluid underground. The glazed surface of the conduit helps in temperature conservation. The conduit is so constructed that pipe-bearing rollers can be placed wherever desired. In soft or wet grounds a cement stone or vitrified burned clay foundation is placed under each piece of conduit, where the bearing roller rests. The conduit is made of a hard-burned, vitrified, glazed shale.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago.—Favorable action on installation of 9,500 tons of 30-inch pipe at Highland Park, Mich., seems assured. The U. S. Cast Iron Pipe & Foundry Company has sold about 1,500 tons and booking of routine orders aggregated about 1,000 tons. Quotations: 4 inch, \$26; 6 to 12 inch, \$24; 6 inch and upward, \$23.50.

Birmingham.—Little reported in way of new orders and manufacturers see no prospect of increasing output. Quotations: 4 inch, \$20.50; 6 inch and upward, \$18.50.

New York.—Bids getting close to one another. Metropolitan Sewerage Commission, Boston, opened bids on 700 tons of 60 inch; otherwise no important municipal lettings. Quotations: Carload lots of 6 inch, \$20.50 to \$21 per ton.

Lead.—New York, 3.90c.; St. Louis, 3.75c.

The National Reinforced Concrete Pole, Pile and Pipe Company has been incorporated under the laws of Colorado, and has taken over all of the patents of R. M. Jones, of Denver, excepting California and the Territories, and arrangements have been completed by which the

company will install a manufacturing plant in the vicinity of Chicago to be in operation by Sept. 1, 1914.

Waddill Catchings of the class of 1901 of Harvard University, and president of the Central Foundry Company, has offered to the students of Harvard University and the Institute of Technology a prize of \$200 for the best thesis on the subject relating to house plumbing or the materials used in such systems. The thesis must contain 500 to 1,000 words, and the awards will be made by a committee appointed by Professor George C. Whipple and Gifford LeClear.

E. D. Etnyre & Co., Oregon, Ill., will deliver immediately a motor-driven

street flushing machine to the city, according to a contract given the company by the board of works on its proposal of \$4,300.

The Peebles Paving Brick Company, which has two plants at Portsmouth, Ohio, has purchased a plant at Firebrick, Ky., and will manufacture the "Dixie" brand of Wire-Cut-Lug Brick.

Goodyear Tires.—Good results accompany a series of car and tire dealers' meetings which the Goodyear Tire & Rubber Co. is conducting in various principal cities. Goodyear, having proved in the practice of its own sales policies that a successful tire business can be conducted on a standardized merchandising basis, has been interesting dealers in the development of standards in at least a part of their own business. The meetings are held in behalf of better merchandising, and have not been merely occasions for the exclusive exploitation of Goodyear.

PERSONALS

These mayors were recently elected.

Timmons, S. C.—W. H. Lewis.
Aberdeen, Wash.—L. E. Cook.

Anderson, S. C.—L. H. Godfrey.

Denton, Tex.—Mayor Foreman has appointed the following officers: Luther Hoffman, City Attorney; Garrett Wells, Marshal; Dr. F. E. Piner, City Health Officer; J. W. Erwin, City Secretary.

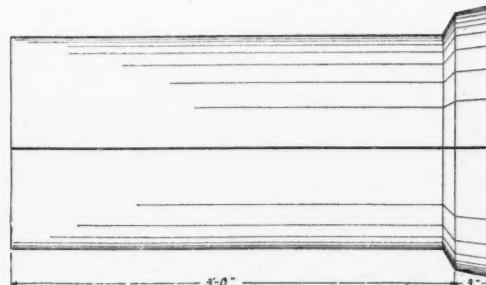
Kelly, T. J., is acting mayor of Everett, Wash.

Mallary, Joseph S., has resigned as Fire Marshal of Philadelphia, Pa., to become Chief Engineer of the Merchants & Evans Co., of Philadelphia. He is succeeded as Fire Marshal by George W. Elliott, Deputy Fire Marshal.

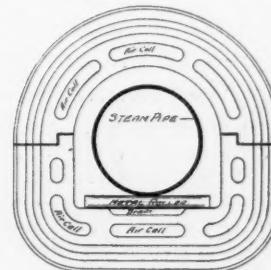
McClellan, William, F. Am. Inst. E.E., Consulting Engineer, New York City, formerly Chief of the Division of Light, Heat and Power, Public Service Commission, Second District, New York, has been appointed "Confidential Engineer" in charge of the physical valuation and investigation of the New York Telephone Co.

Moody, W. H., formerly superintendent of Middletown division of the state highways of Massachusetts, has been chosen superintendent of streets of Naugatuck, Mass.

Stark, E. A. has been re-elected fire chief of Lodi, Cal.



LONGITUDINAL ELEVATION



ELEVATION OF SOCKET END

VIEWS OF CAMPFIELD AIR CELL CONDUIT.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
STREETS AND ROADS.				
O., Cleveland	10 a.m., July 18.	Constructing embankment	County Commissioners.	
Ind., Shelbyville	11 a.m., July 18.	Grading, draining & graveling highways in two counties.	Comrs. of Decatur & Shelby County	
O., Delaware	11 a.m., July 18.	Grading, draining, graveling or macadamizing several miles	F. C. Higley, Co. Surv.	
Ill., Allison	July 18.	Several gravel roads; estimated cost, \$12,000.	J. L. McAndrew, Clk.	
O., Dayton	10 a.m., July 18.	Completing embankment and graveling.	W. H. Aszling, Secy.	
W. Va., New Martinsville	Noon, July 18.	Constructing about 22 miles of brick road.	S. Myers, Co. Clk.	
Ill., Westport	July 18.	Constructing system of free gravel roads.	Highway Comrs.	
Ind., Terre Haute	11 a.m., July 18.	Grading and paving.	N. G. Wallace, Co. Aud.	
Ill., Sterling	7.30 p.m., July 18.	Grading, paving and curbing.	M. Potts, Sec. B. L. I.	
Ind., Marion	10 a.m., July 18.	Furnishing one steam road roller.	Co. Comrs.	
Tex., Corsicana	2 p.m., July 18.	Constructing system of gravel roads, including bridges, culverts, etc.	H. D. Johnson, Co. Aud.	
W. Va., Jacksonburg	July 19.	Grading or building 25 miles of road.	Co. Clk., New Martinsville.	
Ind., Fort Wayne	10 a.m., July 20.	Grading, draining and paving with stone.	Allan & Noble, Co. Auditors	
Wis., Clintonville	7.30 p.m., July 20.	Concrete and asphaltic concrete pavements on several streets	Committee on Streets.	
Tex., Houston	Noon, July 20.	Constructing system of roads, bridges and culverts.	J. W. Maxcey, Engr.	
N. J., Camden	8 p.m., July 20.	Paving several streets, with Belgian block, also constructing sewer.	J. C. Hains, Chr. Com. Sts. & Hwys.	
Wash., Bellingham	1 p.m., July 20.	Road impt., clearing, grubbing & grading.	W. D. Wallace, Co. Aud.	
Wash., Seattle	2 p.m., July 20.	Constructing one road.	B. Phelps, Clk. Co. Comrs.	
Wash., Olympia	2 p.m., July 20.	Clearing, grading & draining about 1.8 miles of hwy.	State Highway Board	
N. J., Rahway	8 p.m., July 20.	Sidewalks, curbs and gutters.	H. T. Holliday, St. Comr.	
Minn., Duluth	10 a.m., July 20.	Grading and surfacing.	C. S. Palmer, City Clk.	
Ind., Indianapolis	July 20.	Curbing and paving.	J. A. Rink, Pres. B. P. W.	
Ill., Dolton	8 p.m., July 20.	Concrete paving.	Chas. Dickelman, Pres. Vil. T. Board Local Improvements.	
Ill., Chicago	11 a.m., July 20.	Cement sidewalks.		
Ind., Huntington	7.30 p.m., July 20.	Vitrified brick, sheet asphalt, wood block with bituminous concrete.	H. I. Young, City Clk.	
Ill., Peoria	July 20.	7,300 sq. yds. of paving.	Board of Local Imp.	
Pa., Clairton	8 p.m., July 20.	Grading, paving, concrete curb and gutter.	H. M. Gates, Clk. Council.	
N. J., South Orange	8 p.m., July 21.	Flagstone sidewalks, and grading, macadamizing cement sidewalks, curbs and gutters.	C. A. Cross, Chr. Co. Som.	
N. J., Linden	8 p.m., July 21.	Macadamizing three streets, about 3,000 ft. 9 ft. wide & 8 ins. deep.	C. H. Smith, Boro Clk.	
Ala., Decatur	8 p.m., July 21.	Constructing pavements of macadam, gravel, asphalt, etc.; also cement curbs and gutters, etc.; estimated cost, \$150,000.	P. J. Edwards, Mayor.	
Pa., Harrisburg	July 21.	Constructing highways of brick, asphaltic bituminous macadam and other materials.	State Hwy. Dent.	
N. J., Trenton	2.30 p.m., July 22.	Paving with bituminous concrete on several streets.	F. Thompson, City Clk.	
Ind., Gary	July 22.	5,590 sq. yds. macadam, 8,686 sq. yds. brick, 4,470 sq. yds. concrete, 8,260 sq. yds. of sidewalk, cost \$52,975; oiling streets, requiring 50,000 gals. of oil, cost \$8,530.	W. J. Fulton, City Engr.	
O., Perrysburg	Noon, July 22.	Paving two streets.	G. Champe, Engr., Toledo.	
Pa., Pittsburgh	10 a.m., July 22.	Constructing several counties.	P. J. Cunningham, Co. Cont.	
Pa., Pottsville	July 22.	Grading, curbing and paving; including about 12,866 sq. yds. treated wood block for vit. brick.	City Clerk.	
Ill., Springfield	Noon, July 22.	State-aid work; nine contracts for conc. & two for brick.	Highway Commission	
O., Canal Dover	Noon, July 22.	Grading, curbing and paving.	Osmond Salmon, Dir. P. S.	
N. Y., Brooklyn	11 a.m., July 22.	Grading, curbing and sidewalks and asphalt blocks on concrete.	J. H. Pounds, Boro. Pres.	
N. J., Perth Amboy	8.30 p.m., July 22.	Several thousand square yards of asphalt block pavement.	E. M. Adair, Str. Comr.	
Ill., Springfield	July 22.	Constructing concrete and brick pavements in several towns.	A. N. Johnson, St. Hwy. Eng.	
N. J., Trenton	2.30 p.m., July 22.	Park improvements.	Frank Thompson, City Clk.	
Ill., Chicago	11 a.m., July 22.	200,000 gallons road oil.	L. E. McGann, Comr. P. W.	
Ill., Chicago	11 a.m., July 22.	Creosoted wood block, vit. brick, concrete, paving improvements and sewer adjustments.	G. A. Schilling, Pres. B. L. I. Mayor.	
Pa., Lebanon	5 p.m., July 23.	10,000 sq. yds. paving.	Co. Comrs.	
O., Loraine	1 p.m., July 23.	Grading, draining and macadamizing.	W. O. Davis, Sec. Bd. Comrs.	
Pa., Alden Station	7.30 p.m., July 23.	Grading, paving and curbing.	Board Local Improvements.	
Ill., Springfield	10 a.m., July 23.	Brick.	T. R. Crowell, City Engr.	
Pa., Lebanon	5 p.m., July 23.	20,000 sq. yds. street paving.	J. Scott, Clk. of Board.	
O., Columbus	July 23.	Improving and macadamizing several streets.		
Wis., Neenah	2 p.m., July 23.	Improving several streets with combined concrete curb and gutter.	H. M. Zemlock, Sec. Bd. P. W.	
Wis., Portage	Noon, July 24.	16,000 ft. of concrete curb and gutter; 23,000 yds. of vit. brick pavement, and 4,600 ft. of vit. pipe storm sewer.	F. R. Goss, Acting City Clk.	
O., Cincinnati	Noon, July 24.	Treating road with bituminous road surfacing.	County Comrs.	
O., Edon	Noon, July 24.	Paving two streets.	C. Champe, Engr., Toledo.	
Pa., Greensburg	Noon, July 24.	Macadamizing, paving with brick, using drains and steel reinforcement, and constructing wire fence.	J. S. Sell, Co. Cont.	
R. I., Cumberland	Noon, July 24.	Curbing and paving.	J. V. Brobbick, Twn. Clk.	
Wis., New Glarus	July 25.	7,960 sq. yds. paving.	Wm. G. Kirchoffer, Eng., Madison.	
Tenn., Lewisburg	Noon, July 25.	Bituminous macadam, plain macadam.	J. A. Loyd, Mayor.	
O., Cleveland	10 a.m., July 25.	Constructing and repairing one road.	E. G. Krause, Clerk.	
N. Y., Albany	1 p.m., July 27.	Paving and repair work in several counties. (See proposal ad).	J. N. Carlisle, Comr.	
Ala., Athens	July 27.	Graveling one road.	W. S. Keller, State Hwy. Eng., Montgomery.	
O., New Lexington	Noon, July 27.	Grading, graveling and paving with brick.	P. G. Skinner, Vil. Clk.	
O., La Grange	Noon, July 27.	Slag with asphalt binder.	C. A. Rawson, City Clk.	

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Neb., Auburn		8 p.m., July 27.	Paving	W. B. Fisher, City Clk.
O., Conneaut		Noon, July 27.	Grading, draining, shale block paving	S. W. Mahaffey, Dir. P. S.
Del., Wilmington		Noon, July 28.	Macadam roads	James Wilson, Newcastle Co. Hwy. Comr.
Va., Roanoke		Noon, July 28.	Granolithic sidewalks in various streets	M. D. Moss, Asst. C. C.
Pa., Washington		July 29.	Constructing several miles of brick road with necessary culverts, etc.	Chaney & Armstrong, Co. Engrs.
O., La Rue		July 29.	Paving with asphaltic block and vit. brick on concrete and cement curb; cost, \$32,000.	J. V. Campbell, Vil. Clk.
Ind., South Bend		11 a.m., July 30.	3,700 ft. of gravel road improvement	C. Sedgwick, Co. Aud.
O., Cincinnati		Noon, July 31.	Improving one street	A. Reinhardt, Clk.
Wis., Marinette		2 p.m., July 31.	9-inch macadam combination concrete curb and gutter, and concrete roadways	Board Public Works.
Pa., Pittsburgh		10 a.m., July 31.	Road improvements	R. J. Cunningham, Allegheny Co. Cont.
Neb., Omaha		Noon, Aug. 1.	Granite paving block and cement curb	Frank Dewey, Douglas Co. Clk.
Wis., Delavan		10 a.m., Aug. 1.	Cement curb and gutter	City Clerk.
Ind., South Bend		11 a.m., Aug. 3.	Gravel road improvement	Clarence Sedgwick, Aud. St. Joseph Co.
Ind., Brazil		Aug. 4.	Macadam roads	E. A. Staggs, Clay Co. Aud.
O., Toledo		10:30 a.m., Aug. 4.	Improving eight county roads, aggregating 19 miles	C. J. Sanzenbacher, Co. Aud.
O., Massillon		Aug. 4.	Paving one road, cost about \$100,000	State Hwy. Dept., Columbus
O., Marion		Noon, Aug. 4.	Paving one street	A. C. Cass, Dir. Pub. Service.
Ind., Harrison		10 a.m., Aug. 5.	Gravel roads	F. M. Williams, Del. Co. Aud.
Ind., Shelby		11 a.m., Aug. 5.	Grading, draining and graveling	W. Fagel, Shelby Co Aud
Minn., St. Paul		2 p.m., Aug. 6.	Excavating machinery, fitted with orange peel bucket	C. L. Potter, Lieut.-Col. Engr. U. S. A.
Ind., South Bend		11 a.m., Aug. 31.	13,200 ft. gravel road	Clarence Sedgwick, Aud. St. Joseph Co.

SEWERAGE

B. C., Vancouver		July 18.	Sewer work to cost about \$300,000.	Vancouver & Joint Sew'ge Bd.
O., Castalia		Noon, July 18.	Settling basins and drainage in school	W. H. Rogers, Jr., Clk. B. of E.
Ill., Carlisle		2 p.m., July 18.	Vitrified glazed sewer	H. C. Norcross, Mayor.
Wis., Marinette		2 p.m., July 18.	Sewers	Board Public Works.
Ia., Rock Rapids		July 19.	3,000 ft. 8-inch sanitary sewer	J. K. Megberry, City Clk.
Mont., Walkerville		8 p.m., July 20.	Sewer	J. I. Broughton, City Clk.
Minn., Benson		7 p.m., July 20.	12-inch sewer, manholes and catch basins	O. J. Olsen, City Clk.
R. I., Providence		2:15 p.m., July 20.	Sewers	J. H. Gainer, Mayor.
Ia., Mason City		10 a.m., July 20.	Vitrified sewer pipe	J. H. McEwen, City Clk.
Minn., Ortonville		8 p.m., July 20.	Sewer system	E. Scheibe, City Clk.
Pa., Tarentum		7 p.m., July 20.	Sanitary sewer, sterilizing and pumping plant	W. F. Denny, President Boro Council.
Minn., Deerwood		July 20.	Constructing about 6,700 ft. 15-8-inch vit. pipe sewer, with septic tank, etc.	Village Clerk.
N. J., Perth Amboy		8:30 p.m., July 20.	Extending 15-inch outlet for 72 feet	J. J. Clark, Chr.
Mich., Bay City		9 a.m., July 20.	Constructing a 10-inch socket tile sewer	Board Public Works.
Pa., Tarentum		July 20.	Constructing 4,000 ft. 12-inch sanitary sewer; with 15 manholes, and combined sterilizing & pumping Station	Borough Council.
Mont., Havre		8 p.m., July 20.	Constructing five miles of sewer, filtration and disposal plant	S. L. Hanley, City Engr.
Del., Wilmington		10 a.m., July 21.	Supplying sewer department for period of one year with cement, terra cotta pipe, castings, sewer brick, etc.	Directors of St. & Sew. Dept.
N. J., New Brunswick		10 a.m., July 21.	120,000 feet of ditching	D. J. Headlee, Ex. Off.
Ill., Berwyn		8 p.m., July 21.	Constructing one sewer	O. N. Lindahl, Secy. B. L. I.
Ia., Webster City		7:30 p.m., July 21.	11,900 ft. pipe sewers and disposal plant	C. H. Currie, Engineer
Ia., Clarion		7:30 p.m., July 21.	Sanitary sewerage system and disposal plant, \$45,000	City Clerk.
Utah., Salt Lake City		10 a.m., July 21.	Sewers	Carl Scheid, City Rec.
N. J., Summit		July 21.	Constructing pipe storm sewer	A. Blair, City Eng.
N. Y., Niagara Falls		7:30 p.m., July 21.	Seven sewers	Thos. J. Hogan, City Clk.
N. J., South Orange		8 p.m., July 21.	Sanitary sewers, manholes and flush tanks	Chas. A. Cross, Chr. Co. Com.
Minn., Aurora		8 p.m., July 22.	Excavating and laying 10-inch sewer	W. J. Lord, Vil. Recorder.
Cal., Long Beach		Noon, July 22.	Constructing a complete sewer system	Board Public Works.
O., Canal Dover		Noon, July 22.	Constructing sewage purification plant. (See Proposal ad)	Director Public Service.
Md., Kensington		July 23.	Sewer and water system costing \$50,000	H. W. Hutton, Engr., Wilmington, Del.
O., Amherst		Noon, July 23.	3,400 ft. of sanitary sewers in several streets	C. J. Aschenbach, Vil. Clk.
Mo., Carthage		5 p.m., July 23.	Constructing trunk sewer, estimated cost \$25,000	J. B. Lloyd, City Clk.
Ill., Carrollton		9 a.m., July 24.	Sanitary sewer system and disposal plant	Caldwell Engrg. Co., Jacksonville
O., Akron		July 24.	Constructing sewer system and sewage treatment plant	County Comrs.
N. Y., Bedford Hills		July 24.	Making addition and alterations to sewerage and sewage disposal plant	J. Wood, Pres. Bd. Mgrs.
Wis., Portage		Noon, July 24.	23,000 sq. yds. vitrified pipe storm sewer	Fred F. Gross, Act. C. C.
Minn., Blue Earth		1:30 p.m., July 24.	Tile ditch	J. L. Hering, Faribault Co. A.
O., Springfield Lake		Noon, July 26.	Sewerage system and sewage treatment plant	R. W. Pratt, Con. Eng., Cleveland.
Tex., Houston Heights		8 p.m., July 27.	Thirty miles of vit. pipe sewer, from 8-24 inches	H. F. Isbell, Mayor.
Va., Roanoke		Noon, July 28.	Storm drains, sewers, etc., in various streets	M. D. Moss, Asst. C. C.
N. J., Newark		July 28.	Constructing main intercepting sewer in Passaic	Passaic Valley Sew. Comm.
O., Struthers		noon, July 29.	Storm water and sanitary sewers	J. Richards, Clk.
Ind., Hammond		10 a.m., July 31.	12-inch vit. socket pipe sewer	Board Public Works
Ia., Baton Rouge		Noon, Aug. 1.	36,000 ft. vit. pipe sewer, 6-12-inch, together with c-i. pipe, flush tanks, etc.	Mayor.
Wis., Appleton		9 p.m., Aug. 1.	Sewer	E. L. Williams, City Clk.
Ia., Baton Rouge		Noon, Aug. 1.	36,000 lin. ft. vit. pipe sewer, c. i. pipe, flush tanks and manholes	J. J. Mundiger, City Engr.
O., Sandusky		Aug. 14.	Constructing one mile ditch	L. A. Schultz, Engr.

WATER SUPPLY.

Ill., Carlisle		2 p.m., July 18.	Water mains	H. C. Norcross, Mayor.
O., Cleveland		Noon, July 19.	Furnishing and driving sheet steel piling; stop cock boxes	A. R. Callow, Com. P. & Sup.
O., Orchard		July 20.	Water works	A. Sherrig, Vil. Clk.
Ecuador, Guayaquil		July 20.	Cast-iron pipe and specials	J. G. White & Co., 9 Clark Lane, London, E.C., England.
Ill., Greenup		3 p.m., July 20.	Water works and light plant	Edward Button, Vil. Clk.
N. Y., Niagara Falls		4 p.m., July 20.	Constructing water main and appurtenances in several streets	F. S. Parkhurst, Jr., Eng.
O., Frankford		July 21.	Installing water works system	G. H. Shaddel, Clk. Bd. Trustees, Public Affairs.
Ga., La Grange		July 21.	Water works system, including two brick pumping stations, filtration plant and electric pumping machinery, etc.	J. D. Edmundson, Mayor.
Ark., Arkansas City		July 21.	Improving water works by extending pumping station, furnishing 2,000,000-gallon pumping engine, 250,000-gallon tower and tank, etc.	City Clerk.
O., Clyde		July 21.	Improving water works by repairing wells, steam pump, etc.	Clerk, Board Trustees.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ill., Berwyn	8 p.m., July 21.	Water service supply pipe (4 jobs)	Board Local Imp.	
Utah, Bingham Canyon	2 p.m., July 22.	220 tons 6-8-inch c.i. water pipe and 4,000 lbs. special castings	F. W. Quinn, Town Clk.	
N. Y., Hudson	7.30 p.m., July 22.	Waterproofing wall and constructing 6-in. reinforced cut-off wall	M. J. O'Hara, City Engr.	
Ill., Chicago	11 a.m., July 22.	12 electric driven air compressors for water tunnel	L. E. McGann, Com. Pub. Wks.	
O., Cleveland	Noon, July 23.	Constructing a concrete coagulant house and wash water reservoir. (See Proposal ad.)	A. R. Callow, Comr. Pub. & Supplies.	
Ill., Summit	8 p.m., July 23.	Installing machinery, constructing a concrete reservoir and pipe for water system	City Clerk.	
Alta., Bamff	July 27.	Laying and jointing 13,000 ft. 20-inch lap-welded steel pipe	Secy. Dept. Interior, Ottawa.	
Ont., Grinnell	July 27.	Furnishing and erecting motor driven turbine pumps and equipment	Secy., Water & Light Co.	
Me., Pownall	July 30.	Constructing concrete reservoir	A. B. Fels, Portland.	
Colo., Denver	2 p.m., July 30.	1,750 60-inch; 8,560 32-inch, and 2,460 24-inch continuous wood stave pipe	U. S. Reclamation Service.	
Va., Norfolk	Aug. 1.	Furnishing 5,300 meters for water department	Board of Control.	
Tex., San Antonio	Aug. 3.	Two 5-million pumps and steam turbine condensers, also 250 h. p. boilers	San Antonio Water Sup. Co.	
Kan., Enterprise	Noon, Aug. 5.	5,500 ft. 4-inch water main	Ray E. Corbin, City Clk.	
Neb., Dalton	Aug. 27.	Constructing water works, cost \$7,200	J. L. Willis, Village Clk.	

LIGHTING AND POWER.

Pa., Williamsport	July 20.	Street lighting	City Clk.
Ill., Greenup	3 p.m., July 20.	Electric light and water plant	Lincoln Bancroft, Vil. Pres.
Pa., Lebanon	11 a.m., July 24.	Street lighting with gas	Geo. T. Spang, Supt. P. Safety.
Cuba, Guantanamo	11 a.m., July 25.	200 h. p. water tube boilers with accessories	Bureau Yds. & Docks, Washington, D. C.
Wash., Puget Sound	11 a.m., July 25.	40 k. w. turbine-driven exciter	Bureau Yds. & Docks, Washington, D. C.
La., New Orleans	Noon, July 30.	Wire and cable for drainage system	Sewerage & Water Board.
O., Mansfield	Aug. 1.	Furnishing electric light for city	O. Hursh, Dir. of Service
Ia., Denison	Aug. 1.	Constructing municipal lighting plant	J. B. Hill, Engr.
N. D., Stanley	Aug. 3.	Plumbing, heating and ventilating court house	Co. Auditor.

FIRE EQUIPMENT.

Mont., Havre	8 p.m., July 20.	Furnishing combination hose and chemical motor car	S. L. Hanley, City Engr.
N. Y., Canandaigua	July 20.	Furnishing motor combination chemical and hose wagon and chassis for combination wagon	F. B. Cox, Chief.
Ill., Chicago	11 a.m., July 23.	Two steam fire engine boilers	Thos. O'Connor, Fire Marshal.
N. J., Elizabeth	8 p.m., July 23.	Fire house	Wm. Jerome Cox, Sec. Bd. Fire Comrs.
N. J., Elizabeth	8 p.m., July 23.	One triple combination auto pump, one auto combination pump and hose wagon or one steam fire engine with tractor, one combination chemical and hose wagon, one chief's car	Wm. Jerome Cox, Sec. Bd. Fire Comrs.
Pa., Lebanon	11 a.m., July 24.	Six fire alarm boxes	Geo. T. Spang, Supt. Pl. Safety.
O., Sandusky	Noon, July 27.	Fire Station	Charles Thien, Dir. P. S.

BRIDGES.

N. Y., Ithaca	July 18.	Constructing highway bridge	F. Hanchow, Town Clk.
Ill., Winchester	Noon, July 18.	Reinforced conc. bridge, 60-ft. span, cost \$3,000	E. H. Vannier, Co. Supt. Hwy.
Ia., Clinton	2 p.m., July 20.	Reinforced concrete bridges	F. G. Hansen, Co. Aud.
Ind., Marion	10 a.m., July 20.	Constructing flat top culvert	Co. Comrs.
Minn., Karstad	2 p.m., July 20.	Reinforced concrete bridge	C. J. Johnson, Clk. Co. Board.
N. Y., Albany	Noon, July 21.	Six stone and concrete bridges	Somerset County Comrs.
N. J., Elizabeth	2.30 p.m., July 23.	Constructing one bridge	J. L. Bauer, Co. Engr.
Pa., Rochester Mills	9 a.m., July 25.	Erecting 2 reinforced concrete bridges, 12 ft. span each	Board Supervisors.
Va., Leesburg	Noon, July 26.	Constructing reinforced concrete bridge	State Hwy. Comr., Richmond.
O., Bowling Green	1 p.m., July 27.	Reinforced concrete arch bridge	County Commissioners.
N. J., N. Brunswick	2.30 p.m., July 30.	Constructing steel and concrete bridge	A. J. Gebhardt, Director.
Pa., Johnstown	1.30 p.m., July 30.	Approaches, substructure and superstructures	D. W. Peck, Supt. Pub. Wks.
O., Delaware	Noon, Aug. 3.	Superstructure	W. V. Aldrich, Del. Co. Aud.
O., Columbus	2 p.m., Aug. 4.	Constructing bridges and culverts	J. R. Marker, St. Hwy. Engr.
O., Marietta	Noon, Aug. 7.	Bridges	W. B. Alexander, Wash. Co. Aud.

MISCELLANEOUS.

Ill., Chicago	Noon, July 18.	Playground apparatus	A. W. Belfuss, Ch. M. Special Park Comm.
Cal., San Francisco	Aug. 19.	Constructing Twin Peaks tunnel, cost about \$3,300,000	Board Public Works
Mass., Holyoke	2 p.m., July 21.	Jail work	Oscar C. Ferry, Asst. Clk., Bd. Pub. Wks.
N. Y., Hudson	7.30 p.m., July 22.	Furnishing material and labor for waterproofing old wall and constructing 6-in. reinforced concrete cutoff wall (See proposal ad.)	M. J. O'Hara, City Engr.
Cal., Los Angeles	July 22.	Furnishing materials and erecting riveted steel pipe	U. S. Reclam. Service
Ia., Le Mars	3 p.m., July 23.	Constructing complete post office	O. Wenderoth, Sup. Arch. Treasury Dept., Wash., D. C.
N. J., Camden	8 p.m., July 23.	One automobile runabout	A. L. Jones, Chr. Elec. Comm. Carlyle & Sherrill, Architects. Pittsburgh.
Pa., Beaver	Noon, July 23.	Jail	
Ont., Ottawa	July 27.	Supplying about 6,000 lbs. of galv. iron telegraph wire and submarine cable	Secy. Dept. Public Works
Tenn., Memphis	11 a.m., July 27.	40,000 tons of rip rap stone	Mal. E. M. Markham, U. S. Engineer
Ill., Chicago	11 a.m., July 29.	Coal handling machinery at pumping station	L. E. McGann, Comr. P. W.
Ind., Gary	3 p.m., Aug. 6.	Constructing two-story post office	O. Wenderoth, Sup. Architect. Treasury Dept., Washington

STREETS AND ROADS

Birmingham, Ala.—City Engineer Kendrick has submitted plan for opening of Twenty-sixth street into new viaduct by means of erecting short approach from about First alley.

San Francisco, Cal.—Vitrified brick is recommended by consulting architects for paving streets in civic center. Cost, \$200,000.

Bridgeport, Conn.—Widening and paving of Noble Ave. is being urged.

Hartford, Conn.—Board of Public Works has voted to recommend permanent paving of Lafayette street from Washington to Grove street.

Wilmington, Del.—Resolution has been adopted by court authorizing highway commissioner to prepare plans and specifications, and to make all necessary surveys for new stretch of road leading from Boyd's Corner to town limits of Blackbird village to point short distance beyond Blackbird station.

Jacksonville, Fla.—A cross country road, considered of much importance,

is to be paved by county commissioners, the road being one which will connect Main street at Fifty-fourth street and the Lem Turner road at Forty-ninth street.

Freeport, Ill.—Indications that brick would be substituted for concrete as material for road to be built with state aid, extending mile east from St. Vincent's orphanage, was shown at meeting of board of supervisors. County Superintendent of Highways Hiveley explained that under new state law where aid is given for hard roads material must be

either concrete or brick. He said state's proposition of cost is \$7,800, with similar amount raised by county.

Quincy, Ill.—Resolution by Aldermen Bickhouse and Hummert asking that alley running north and south between Oak and Vine and Thirteenth and Fourteenth streets be put in good condition has been referred to board of public works.

Sterling, Ill.—Eighth avenue, between Third and Second streets is to be included in East Second street improvement. Board of Local Improvements has been instructed to include this block in estimates, property owners all having asked for improvement.

Bedford, Ind.—Lawrence County gravel road bonds have been sold as follows: To Citizens Trust Co., of Bedford, \$6,200; to Breed, Elliott & Harrison, Indianapolis, \$11,500.

Hartford City, Ind.—Three big road contracts will be offered for sale at session of board of county commissioners August 3. They are: Monroe street, Franklin street and Roberts road on which report of viewers and engineer was approved at July meeting of the board. The Monroe street and Franklin street roads are to be improved under three mile road law. New specifications provide for improvement of part of street with concrete and remainder with water bound macadam with combination curb and gutter along all that part of improvement within city limits. Estimated cost of road is \$70,349.53, which is about \$16,000 less than cost of a brick pavement. Specifications call for improvement of road with water bound macadam from Kentucky ave. east to Monroe street, south on Monroe street to Kickapoo street and from south line of Panhandle railroad to Ritter gravel road. The Ritter road, which is included in improvement, is also to be improved with macadam, but will not have curb and gutter. That part of street between Kickapoo and the Panhandle railroad is to be improved with concrete. Estimated cost of improvement of Franklin street is \$48,092.70. This road is 10,641 feet long and extends from Lake Erie tracks west on Franklin street to Wabash avenue, from which point it follows avenue north to Clouser corner. Pavement is to be constructed of crushed stone with combination curb and gutter. The Roberts road is in Harrison township. Estimated cost on this road is \$8,968.70.

Huntington, Ind.—Three bids, submitted to Board of Public Works for construction of First street pavement have been rejected. Board contended that bids were entirely too high. July 20 was date set for again receiving bids. Two of bids submitted were for asphalt and one for brick.

Laporte, Ind.—Construction of Lincoln highway east from Laporte to St. Joseph County line to connect with road that will be built out of South Bend, has been assured with returns from election in Kankakee Township, Laporte County, when it was voted to construct seven mile strip. Road will be built of macadam and later concrete dressing will be placed on it.

Muncie, Ind.—Bids will be received up to 10 a. m., July 15 for purchase of \$8,400 improvement bonds for improvement of certain highway. G. G. Williamson is Treasurer.

Muncie, Ind.—The Merchants National Bank of Muncie, has purchased the \$16,000 4½ per cent. bonds for Brammer gravel road in Hamilton township, Delaware county.

Richmond, Ind.—Board has ordered city clerk to advertise for bids for improvement of South 19th St., from B St. to Reeveston Road, with concrete street, sidewalks and gutters, parkways in center of street, and conduit systems for wires.

Shelbyville, Ind.—Bids will be received until 10 a. m., July 15 for purchase of \$3,740 and \$7,560 improvement bonds. W. A. McDonald is Treasurer.

Shelbyville, Ind.—Following improvement resolutions have been introduced and acted upon as indicated: For cement improvements to South street, between Harrison and Shelby streets; finally adopted. For improving south Tompkins street between South and Colescott streets; primarily adopted. To improve Elm street between Taylor and South streets with curb and gutter on both sides, primarily adopted. To improve Hamilton street between Broadway and John street, primarily adopted.

Terre Haute, Ind.—An issue of \$6,500 gravel road bonds has been sold to Breed, Elliott & Harrison, Indianapolis.

Vincennes, Ind.—At meeting of Board of Works, City Engineer Watts was ordered to prepare specifications for paving of entire length of Fourth street.

Vincennes, Ind.—After much agitation County Commissioners have decided to give concrete road building thorough test and awarded contract for building of 5,180 feet, 24 feet wide, to start at county fair grounds and run east. Contract price was \$14,271.

Iowa City, Ia.—Bids will be opened at City Hall on August 7 at 2 p. m., for improving following streets with brick, bitulithic, or such other material as may be selected by council: Snook's Grove Road, 4 blocks. Dodge street, 1 block. Van Buren street, 7 blocks. Governor street, 2 blocks. Burlington street, 3 blocks, and Washington street, 5 blocks. Total amount of paving, about 22 blocks or 2½ miles. Wm. Herring, C. E., is City Engr.

Keokuk, Ia.—Resolution has been adopted for improvement of various streets by paving with brick blocks. O. W. Sandberg is City Clk.

Salisbury, Md.—Council has sold \$30,000 street bonds.

Hancock Mich.—Common Council has decided that permanent improvements should be made to some of streets in city that are in very bad condition and that work should be started at very earliest possible moment.

Duluth, Minn.—West Michigan St., Piedmont Ave. and West Superior St., between 12th and 15th Aves., being that part of main western highway which circles the Point of Rocks, may be paved this season.

Jefferson City, Mo.—Ordinance has been passed for improvement of alley between High and McCarty and Monroe and Madison. Ordinances have also been passed for improvement of Washington street between Ashley and Atchison and Hart between Main and High. Resolution was passed for improvement of Atchison between Washington and Monroe.

Joplin, Mo.—Estimates for repaving Main street from First to Third streets and from Tenth to Twentieth streets with wood blocks and brick have been requested by Commissioner J. B. Hodgdon and adopted by City Council. Estimates also were asked on following proposed improvements: Concrete curb and gutter on both sides of Melvin avenue from Seventh to Tenth streets. Concrete curb and gutter on both sides of Division street from Central avenue to Valley street. Concrete sidewalks on both sides of Broadway from Mineral avenue to High street. Paving with brick the alley between Japlin and Wall streets between Third and Fourth streets.

South St. Joseph, Mo.—Movement is on foot to pave streets east of Kill Hill Ave.

St. Joseph, Mo.—Ordinance has been passed to provide for paving (with asphalt), Lake avenue, from Missouri avenue to Cherokee street and for curbing, recutting and resetting curbing, paving driveways and for resetting gutters and cross gutters. Also ordinance appropriating money for the construction of sidewalks on Third street, abutting lots 5 and 6, block 31, Robidoux Addition. R. Van Houten is Deputy City Comp.

Billings, Mont.—Ordinance calling for bids for paving of First Ave. north from North 21st St. to city limits has been passed. Bids will be received July 21, and contractor is given until October 1 to finish. Avenue will be paved with either bitulithic, hassam or concrete.

Goldfield, Nev.—Bond election to provide \$25,000 for work on roads of Esmeralda County has been carried by over two to one.

Atlantic City, N. J.—Under supervision of County Engineer A. H. Nelson, a force of surveyors are busily engaged in making survey of proposed Absecon-Atlantic City Boulevard. It is hoped to have data compiled in time to present it before Board of Freeholders at their next meeting. Road, if constructed, will start just above Absecon Creek bridge at intersection of Philadelphia and New York avenues, and run in straight line across meadows arriving at end of Missouri avenue. From this point it will run up Arctic avenue as far as Maryland, striking every cross avenue.

New Brunswick, N. J.—Aldermen have decided to pave Remsen avenue, Condict, Bristol and Courtland streets with concrete and to award contract for same to Thos. M. Riddle.

New Brunswick, N. J.—Estimates on regulating, grading and paving Baldwin St., between Livingston and Codwise Aves., have been received by Common

Council and referred to streets and roads committee.

New Brunswick, N. J.—Plans have been drawn for improvement of Highland Park, Metuchen road, from Woodbridge Ave. to Lehigh Valley R. R. bridge at Metuchen.

Perth Amboy, N. J.—New Brunswick avenue will probably be paved with vitrified brick from Lehigh Valley railroad tracks to Mitchell street, three blocks farther than it had originally been intended to pave it, according to wishes of property owners and intention of members of street and sewers committee.

Plainfield, N. J.—Ordinance providing for widening of East 2d St. between Watchung Ave. and Washington St. has been introduced in Common Council by Mr. Blatz of Fourth Ward.

Batavia, N. Y.—Paving of East and West Main streets has been planned.

Binghamton, N. Y.—Paving bonds in sum of \$15,000 have been sold by Board of Estimate and Apportionment.

Brooklyn, N. Y.—Plans have been nearly completed for widening of Queens Elvd.

Newburgh, N. Y.—Paving and permanently improving of William street is being considered. Following is estimated cost: About 8,250 sq. yds. of pavement, about \$21,450.00; About 2,670 lin. ft. new bluestone curbing, about \$2,803.00; about 900 lin. ft. old curbstone redressed and reset, about \$405.00; about 5 cu. yds. extra concrete, about \$30.00; about 5 new catch basins, about \$800.00; about 1 inlet basin, new, about \$100.00; about 5 new sewer manholes, about \$625.00; preliminary surveys, plans, specifications, etc., for awarding of contract, about \$250.00; Engineering, superintending and inspection of work done during construction, about \$1,100.00; advertising, printing and contingencies, about \$437.00; total, \$28,000.00. Approximate cost, with concrete curbing, about \$27,650.00. D. J. Coutant is City Clerk.

Niagara Falls, N. Y.—Resolutions have been adopted for paving or macadamizing of various streets. T. H. Hogan is City Clerk.

Niagara Falls, N. Y.—Improvement of several Niagara roads, which has been under consideration for some time past, has been ordered by the Board of Supervisors at its quarterly meeting. Plans and specifications for improving Warrens Corners road as county highway from new million dollar route 30 highway to foot of Gooding street hill in Lockport, has been authorized; also contract for Shawnee road, west of Lockport, to connect new West avenue pavement with road from Shawnee to Niagara Falls and for completion of the Chestnut Ridge road as a county road from McNall's Corners to Gilbert's Corners. Plans have already been approved for completion of Rapids road to Raymond hill, south of Lockport, and bids will be received for this work until July 25th. Improvement of Niagara road in town of Wheatfield from North Tonawanda-Sanborn road to Buffalo-Niagara Falls boulevard; construction of county road from the Village of Barker to Route 30 and improvement of Beebe and Chestnut roads in town of Wilson have been petitioned for and referred to proper authorities for investigation.

White Plains, N. Y.—Bonds to amount of \$51,000 will be sold to pay village share of improving Post Road, South Broadway and Westchester Ave.

Greensboro, N. C.—Construction of new road from Ashboro to Greensboro is being considered.

Greensboro, N. C.—At meeting of Irving Park Company, it was decided to arrange for construction of about five miles of bitulithic or tarvia streets and driveways over Irving Park suburban development in Country Club section. Roads, which are at present of earth construction, will be regraded and surfaced with monolithic road material. The driveway will be constructed from North Elm street through to Battle Ground road. Broader streets will have parkways built in center of some of them and on borders of others. It is estimated that about \$60,000 will be spent in improvements just as soon as engineering plans are finished.

Statesville, N. C.—The Statesville Board of Aldermen has passed ordinances providing for paving of West Broad street with bituminous macadam, beginning at point where paving was left off at Meeting street and continuing to Statesville Female College, more than two blocks west. Work is to be done immediately. Block of Mulberry street will also be paved, connecting with paving on Broad.

Columbus, O.—Highway Commissioner Marker plans to let road contracts on Aug. 4 to extent of \$2,000,000.

Coshocton, O.—Bonds in sum of \$14,700 will be sold at noon, Aug. 6. Bonds are known as Inter-County Highway bonds of Coshocton County. Frank McCullough is County Auditor.

Piqua, O.—Seasongood and Mayer, of Cincinnati, outbid by only \$5 the Piqua National Bank for the \$33,000 bond issue for improvement of Piqua-Urbana pike.

Sandusky, O.—Paving bonds in sum of \$41,000 will be sold by Fred W. Bauer, City Auditor, on August 1, 1914.

Youngstown, O.—Ordinances have been adopted for improvement of various streets, for which bonds will be sold July 20. D. J. Jones is City Auditor.

Youngstown, O.—Road Commissioners will receive sealed bids and will sell to highest responsible bidder on July 20, 1914, at 1 o'clock p. m., bonds to amount of \$60,000 for purpose of building and improving roads in said district in Mahoning County, Ohio. Frank Agnew is Secy.

Eugene, Ore.—Ordinance adopting plans and specifications of City Engineer for pavement on High St., between 11th and 13th Aves. east has been passed.

Eugene, Ore.—Cement sidewalks will be laid throughout city.

Pottsville, Pa.—City Council has approved plans and specifications for paving of eight squares in West Market St. and two squares in Logan St.

York, Pa.—Highway department has ordered third carload of Amiesite for use in repairing paved streets.

Providence, R. I.—The widening and straightening of North Main St. from Benefit St. to the North Burial Ground is next big highway improvement contemplated by City Council.

Greenville, S. C.—According to a statement made public by Alderman McDavid the laying of pavement on North Main St. is to be completed at early date. New paving will begin at Stone Ave. and will be continued to Earle St. Cost of same will amount to something like \$2,000. City will probably do work of paving instead of issuing contracts.

Sumter, S. C.—At a recent meeting of Chamber of Commerce it was decided to take steps toward widening of North Main St. from Warren St. to city limits and Broad St. from Washington St. as far as was considered advisable.

Loudon, Tenn.—County Court has voted to issue additional road bonds to amount of \$50,000. This makes total bond issue of \$300,000 for good roads in Loudon County.

Dallas, Tex.—Bids on paving of twenty streets recently selected by Board of City Commissioners for improvement from proceeds of street budget this year probably will be called for at regular meeting of the board.

Dallas, Tex.—Board of City Commissioners will act upon resolutions calling for bids on paving of 17 streets selected for improvement under paving budget for current year.

San Antonio, Tex.—Two bids for road work have been received by County Commissioners' Court. One of these was from W. H. Davis for \$8,205 for work on one section of Rockport Road and \$7,717.50 for work on another section. R. M. Johnson bid \$11,347 for work to be done on Trainer-Hale Road.

Whitsett, Tex.—Bonds in sum of \$40,000 for good roads have been voted.

Chehalis, Wash.—Residents of north fork valley of Newaukum River, east of Chehalis, have subscribed nearly \$700 in labor and cash toward making still better road out of portion of their highway into that section.

Seattle, Wash.—Resolutions have been adopted for improvement of various streets.

Niagara Falls, Ont., Can.—Definite action on plan to pave Victoria Ave. will be taken by City Council at meeting to be held.

Niagara Falls, Ont., Can.—Plan to pave Victoria avenue will come before City Council, and according to Mayor Dores and Alderman E. H. Menzie of Board of Works, definite action will be taken.

CONTRACTS AWARDED.

Fort Smith, Ark.—For construction of wood block pavement on North 9th St. from Garrison Ave. to B St.; on B St. to Grand Ave., and on Grand Ave. to North 11th Street. Also North Towsen Ave., from Garrison Ave. to A St., to Burke Bros., of Ft. Smith, at \$2.36 per sq. yd. Contract amounts to nearly 8,000

sq. yds. Contract for about 8,000 sq. yds. of brick was awarded to W. W. Fuller, of Muskogee, Okla., at \$1.89. This calls for vertical fiber brick and will be laid on Grand Avenue, from 11th St. to 16th St.

Treka, Cal.—Clark-Henry Contracting Co., of Stockton, has been awarded contract to pave Main St., which will form connecting link in State Highway. Its bid, which was lowest, was as follows: Square foot of grading, .02 cts.; square foot of asphaltic pavement, .185; square foot gravel shoulder, .09; linear foot of concrete curb, .39; square foot of concrete gutter, .24.

Hartford, Conn.—Contracts for state highway work have been awarded as follows by highway commissioner: Frank Arrigoni & Bro., of Middletown, 1,200 linear feet of native stone macadam resurfacing in the town of Essex for \$3,375, and 4,365 linear feet of native stone macadam resurfacing for the town of Westbrook for \$8,000. Connecticut and Rhode Island Company of Meriden, section of Amiesite paving on Albany avenue, Hartford, at a cost of \$10,413.80. A. C. Sternberg, Jr., of West Hartford, section of concrete road on Bloomfield avenue, Hartford, for \$6,620.50. John DeMichel of Torrington, section of graded road in Salisbury for \$2,902.70. Bristow Brothers & Knowles Corporation of Narragansett Pier, R. I., section of concrete road on Chapman road, Manchester, for \$10,828.60. Webster & Webster of East Hartford, 24,555 linear feet of guard railing for the towns of Eastford, Woodstock and Chaplin, for \$5,250.60.

Chicago, Ill.—By Board of Local Improvements for cement sidewalks on various streets to Albert Graff; General Cement Const. Co.; H. P. Larsen; Simpson Const. Co.; James J. Ferry; Andrew Larsen; West Englewood Const. & Supply Co.; Daniel Ryan; G. Kehl & Son Co.; F. K. Shobe Paving Co., and P. F. Biesen. G. A. Schilling is President.

Springfield, Ill.—Announcement has been made by State Highway Commission of awarding of contracts for construction of two stretches of new state aid road. Contracts were awarded as follows: Livingston county, D. O. Nicholson and A. L. Booth, Gardner, \$19,484; Champaign county, J. W. Stipes and Edward S. Pilcher, \$13,150.

Springfield, Ill.—Sangamon County roads will be improved this summer through state assistance. Contracts are: Peoria road, 3,500 ft., R. F. Egan, of Springfield, \$4,025; Beardstown road, 2,350 ft., and Washington St. road, east of city, 2,200 ft., Henry Nelch, \$9,033; South Sixth St. road, 4,400 ft., John E. Bretz, \$4,030; Chatham road, 2,200 ft., R. F. Egan, \$5,500. Contracts for work were let by State Highway Commission. All paving will be of concrete.

Franklin, Ind.—To Hamlyn Bros., of Acton, Ind., at \$25,840, for construction of two county roads in Franklin.

Freeport, Ind.—W. H. Shons of this city, has been awarded contract to build first hard road in Iowa county, Wisconsin. It is to be of concrete and Mr. Shons is going to do some of building of roads along with building of bridges.

Shelbyville, Ind.—No bids have been received for improvement work to be done on East Washington street. It consists of ninety lineal feet of seven-foot sidewalk and contract for doing work was given to Isaac Peters, at twelve cents per square foot.

South Bend, Ind.—H. W. Reed has been awarded contract for construction of gravel road four miles in length, known as Union street in Mishawaka, by county commissioners. The Reed bid was \$33,850.

Marshalltown, Ia.—To Williams & Sons, of Florence, Neb., at \$0.15 $\frac{1}{2}$ per cu. yd., for excavation of 50,000 yds. of sand—43,000 yds. for T. Binford and 7,500 yds.

Muscatine, Ia.—Following bids for grading have been received: Aug. Korneman, unit price, 16 $\frac{1}{2}$ and 17 cts. per yd., and 1 $\frac{1}{2}$ cts. per 100 ft. overhaul, S. E. Kinsley, unit price 24 $\frac{1}{2}$ and 30 cts. per yd., and 5 cts. per 100 ft. overhaul. Geo. B. Fuller, unit price 25 and 30 cts. per yd. and 2 cts. per 100 ft. overhaul. Contract was awarded to Aug. Korneman.

Cumberland, Md.—The Security Cement and Lime Co., of Hagerstown, Md., have closed contracts with Vang Construction Co., of Cumberland, for 15,000 barrels of Security Portland Cement for use in paving Bedford pike and Frostburg pike. Cement was sold through the Cumberland Hydraulic Cement & Mfg. Co.

Glenwood, Minn.—To D. B. Dougherty, of Willmar, Minn., at \$10,992, for grading, turnpiking, surfacing and installation of culverts over 6 2/10 miles of road between Glenwood and Starbuck.

Butte, Mont.—Contract for grading new addition in southern part of city, owned by Senator W. A. Clark and James H. Rowe, has been let to Peter Bardsen & Co. It is said cost of leveling ground will be \$30,000. Work will be started at once.

Elizabeth, N. J.—For paving with brick Clark Pl. by City Council to Jas. J. Potts, 518 Magie street, at \$8,609.

Westfield, N. J.—Contract for improvement of North street, Webster place, Lincoln road and Standmore place with macadam, curbs and gutters has been awarded to Weldon Contracting Company, and contract for like improvement in Lenox avenue has been awarded to Charles Lentz.

Penn Yan, N. Y.—Charles N. Kelly was only bidder on job for paving Seneca and Water Sts., when trustees met to make award. His bid was \$12,900, and as trustees considered figure reasonable one contract was awarded him. Mr. Kelly is ready to begin work as soon as necessary service connections can be made and expects to finish by November 1.

Rensselaer, N. Y.—For paving by Bd. Contract & Supply, as follows: To Jas. Rigney, Rensselaer, with brick, Elm street, at \$5,887, and 2d street at \$16,756, and with granite blocks Forbes avenue, \$8,287, to M. A. Heenan, Rensselaer, with brick, 6th street, at \$11,997, and Nelson avenue, \$8,650.

Troy, N. Y.—For paving with sheet asphalt on Maple avenue, to Warren Bros. Co., Boston, Mass., at \$5,212.

Port Jervis, N. Y.—For improvement of Wilkins Ave., to Daily & Merritt, Port Chester, N. Y., for \$7,269.50, while William St. job was awarded to William J. Mertz, his figure being \$14,658. On this job trustees agreed to specify blue stone curb from Pearl St. to Smith, balance of curb to be concrete.

Enton, O.—For consideration of \$36,180, the Foster Construction Company, Richmond, Ind., has been awarded contract for building five miles of road extending northwest from this city over Richmond pike. Contract was awarded by State Highway Commissioner Marker. The Richmond concern has two other road contracts in this county. The costs of all three improvements will be borne by state, county, township and abutting property owners.

Hamilton, O.—Contract to furnish 10,000 cubic yards of gravel to be used by Yawger Company in construction of new High and Main street bridge has been awarded to J. W. Faust Transfer Company of this city.

Lisbon, O.—To McLane & Hepburn, city, at \$24,323, for improvement of 2 $\frac{1}{2}$ miles of road in Fairfield.

Newark, O.—Paving contract for Locust street has been let to Henderson & Company of Coshocton, while those on Central and Flory avenues were let to R. H. Miller & Co., of Newark.

Salem, O.—Bids for construction of piece of improved road from west end of corporation line of city to Country Club grounds, distance of one mile and a quarter, along Salem-Damascus road, have been opened at Columbus, and was let to E. E. Morgan & Brothers, at Leetonia, for \$25,000.

Youngstown, O.—Following is list of contracts let for paving of several streets in city: Miller Brothers, paving of Bellevue avenue, \$4,794.70; Charles Harris, paving of Pyatt street, \$5,313.83; Miller Brothers, paving of Thorn street, \$4,923.70; Gartland & Ryan, paving of Webb street, \$1,507.86; Ed Concrcrete, paving of Augusta street, \$2,705.48; Gartland & Ryan, paving of Oklahoma street, \$2,952.10.

Eugene, Ore.—There was only one bid, that of Clark & Henery Construction Co., for paving of Mill St., between 10th and 11th Aves. east with 4-in. concrete base and top dressing of 2-ins. of asphaltic concrete. Bid was \$2,907.30.

Great Bend, Pa.—The T. H. Gill Co. of this place has been awarded two large contracts in New York State during past week which will take some time to complete. They are as follows: Ogdensburg-Waddington road, 9 $\frac{1}{4}$ miles, \$150,000; Jasper-Addison road, 5 miles, \$63,000. Many of the men located here will go to Ogdensburg to work on the new contract.

Hanover, Pa.—Bids for erection of steel-bound concrete curbing on Abbottstown St. have been opened. T. T. Wolf was only bidder, and price asked is 67 cts. per lin. ft. for curbing; extra concreting, \$5 per cu. yd., and extra ex-

cavations, 70 cts. per cu. yd. He was given the contract.

Hazleton, Pa.—For paving of Broad St., contract was awarded by Borough Council to John A. Leffler, of Hazleton. Mr. Leffler has submitted prices on many different makes of brick and Council selected the C. C. W. brick that is manufactured by Clearfield Clay Workings, of Clearfield, Pa. Contract price is \$2.39 a sq. yd. Contract for curb stone was awarded to Contractor William Kramer, of this city. His bid provides for use of Pennsylvania Blue Rock at 68 cts. a ft., and 98 cts. for curbing set complete.

St. Marys, Pa.—To Jos. Weisner, St. Marys, for 4,575 sq. yds. vitr. brick paving on concrete foundation, 3,730 lin. ft. concrete curb, 1,350 lin. ft. storm water drains. W. C. Hirn is Boro. Engr.

York, Pa.—A. B. Kraft has been awarded contract by Standard Bitulithic Company to lay concrete gutters on streets for which company has contract for paving.

Williamsport, Pa.—B. H. Coryell has been awarded contracts for paving St. Boniface street and Louisa street. Bid on St. Boniface street pavement was \$2.06 and on Louisa street \$2.07.

San Antonio, Tex.—Paving contracts on 38 streets have been let by City Council. Contracts total around \$650,000. Streets to be paved under bids awarded by Council, with materials selected, follow: Hays St., from Chestnut St. to New Braunfels Ave.: Western Paving Co.'s 2-in. asphaltic concrete, Bermuda, at \$1.72 a sq. yd., total cost \$19,886.72. Hackberry St. from Commerce St. to Grayson St.: Beebe Construction Co.'s 3-in. vertical fiber brick at \$2.56, \$73,251.80. Starr St. from Chestnut St. to Pine St.: Standard Roofing Co.'s 3-in. vertical fiber brick at \$2.42, \$22,024.60. Texas Bitulithic Co.'s 2-in. bitulithic at \$2.40, \$33,780.30. New Braunfels St. from Van Ness St. to Grayson St.: Standard Roofing Co.'s 3-in. vertical fiber brick at \$2.43, \$14,520.24. Burnet St. from Hackberry St. to Chestnut St.: M. A. Swatek & Co.'s 3-in. vertical fiber brick at \$2.33, \$15,722.86. Sixth St. from Ave. C to Burnett St.: Standard Roofing Co.'s 3-in. vertical fiber brick at \$2.25, \$9,724.15. Lafitte St. from Water St. to Santa Clara St.: M. A. Swatek & Co.'s 3-in. vertical fiber brick at \$2.46, \$14,080.16. Sycamore St. from Commerce St. to North St.: Rushmore & Gowdy's 3-in. vertical fiber brick at \$2.49, \$9,676.35. Santa Clara Ave., from Lafitte St. to Plum St., Rushmore & Gowdy's 3-in. vertical fiber brick at \$2.46, \$2,230.15. Denver Blvd. from Hackberry St. to Cherry St., Roach-Manigan's one-course concrete at \$1.58, \$5,337.25. Carolina St. from Cherry St. to South Presa St.: Rushmore & Gowdy's one-course concrete at \$1.67, \$13,083.80. Hackberry St. from Denver St. to Commerce St.: Beebe Construction Co.'s 3-in. vertical fiber brick at \$2.45, \$50,128.60. Woodlawn Ave., from Belknap St. to Fredericksburg Rd.: Texas Bitulithic Co.'s 2-in. bitulithic, \$2.31, \$61,556.05. Plum St. from Santa Clara Ave. to Goliad St.: Standard Roofing Co.'s 3-in. vertical fiber brick at \$2.46, \$13,432.37. Wyoming St. from Plum St. to Walnut St.: Standard Roofing Co.'s 3-in. vertical fiber brick at \$2.46, \$3,429.80. Labor St. from Carolina St. to Goliad St.: Beebe Construction Co.'s 3-in. vertical fiber brick at \$2.46, \$15,719.90. Water St. from Lavaca St. to Commerce St.: Beebe Construction Co.'s 3-in. vertical fiber brick at \$2.45, \$20,617.25. Presa St. from River to Alamo St.: Roach-Manigan Co.'s 3-in. vertical fiber brick at \$2.47, \$16,718.70. Pereida St. from Garden St. to South Alamo St.: Uvalde Rock Asphalt Co.'s 2½-in. rock asphalt at \$1.86, \$7,060. Johnson St. from Alamo St. to River Ave.: Uvalde Rock Asphalt Co.'s rock asphalt at \$1.85, \$5,634.50. Beauregard St. from river to South Alamo St.: Uvalde Rock Asphalt Co.'s rock asphalt at \$1.86, \$7,588.65. Garden St. and Roosevelt Ave. from Pereida St. to Eads Ave.: Texas Granitoid Co.'s all-trap granitoid at \$2.18, \$85,644. Eads Ave. from Roosevelt Ave. to Presa St.: Roach-Manigan Co.'s 4-in. bituminous macadam at \$0.84, \$9,220.16. East Nueva St. from Garden St. to Alamo St.: Uvalde Rock Asphalt Co.'s 3-in. rock asphalt at \$1.65, \$3,632. Temple St. from Adams St. to Garden St.: Uvalde Rock Asphalt Co.'s 2-in. rock asphalt at \$1.85, \$4,462.65. Mitchell St. from Roosevelt Ave. to South Presa St.: Roach-Manigan Paving Co.'s Mexican bituminous macadam at \$1.35, \$7,556. Gembler St. from South Presa St. to Garden St.: Roach-Manigan Co.'s bitu-

minous macadam at \$0.84, \$1,240. Third St. from Ave. C to Ave. E: Uvalde Rock Asphalt Co.'s rock asphalt, \$1.82, \$5,076.45. Adams St. from Temple St. to Alamo St.: Uvalde Rock Asphalt Co.'s 4-in. rock asphalt at \$1.87, \$14,286.60. North Laredo St. from Morales St. to North Flores St.: Standard Roofing Co.'s 6-in. one-course concrete at \$1.60, \$20,393.52. Cameron St. from Commerce St. to extension of Morales St.: Standard Roofing Co.'s 6-in. one-course concrete at \$1.56, \$17,945.60. Jefferson St. from Pecan St. to Martin St.: Uvalde Rock Asphalt Co.'s 3-in. rock asphalt at \$1.62, \$2,286. Fourth St. from river to Nacogdoches St.: Uvalde Rock Asphalt Co.'s 2½-in. rock asphalt at \$1.87, \$13,958.70. Eighth St. from Ave. C to Austin St.: Western Paving Co.'s 2-in. asphaltic concrete, Bermuda, at \$1.64, \$6,060.50.

Seattle, Wash.—To Jahn Contracting Co., Pioneer Bldg., at \$114,700, for construction of Pacific City road, by King County Commissioners. Contract calls for No. 1 brick on 5-in. concrete base. Unit price was \$1.80 per sq. yd.

Seattle, Wash.—To Todd & Coats, of Coupeville and Everett, Wash., at \$35,888, for construction of Permanent Highway No. 5.

Sheboygan, Wis.—Bids for grading, concrete paving and combination curb and gutter have been opened by Board of Public Works and contracts awarded as follows: Carl Court, from North 13th to North 15th Sts., to Pestien & Naumann; Wisconsin Ave., from North Ninth to North Water St., to John Braun; New York Ave., from North Ninth to North Water St. to John Buteyn. The bids were as follows. For Carl Court: Pestien & Naumann, concrete, \$1.42 per sq. yd.; curb and gutter, 50 cts. Franz Radloff, Plymouth, concrete, \$1.47; curb, 54 cts. John Buteyn, concrete, \$1.50; curb, 60 cts. Ribbens Construction Co., concrete, \$1.44; curb, 58 cts. John Braun, concrete, \$1.47; curb, 56 cts. For Wisconsin Ave.: Pestien & Naumann, concrete, \$1.41; curb, 54 cts. John Buteyn, concrete, \$1.39; curb, 53 cts. Franz Radloff, concrete, \$1.41½; curb, 53½ cts. Ribbens Construction Co., concrete, \$1.39½; curb, 54 cts. John Braun, concrete, \$1.39; curb, 53 cts. Messrs. Buteyn and Braun were tied for the lowest bid and by agreement the contract was awarded to Mr. Braun. For New York Ave.: Franz Radloff, concrete, \$1.43½; curb, 52 cts. John Buteyn, concrete, \$1.39; curb, 53 cts. Ribbens Construction Co., concrete, \$1.39; curb, 54 cts. John Braun, concrete, \$1.42; curb, 53 cts.

SEWERAGE

Hartford, Conn.—Board of contract and supply has opened bids for construction of extension of Homestead avenue intercepting sewer, consisting of 2,856 feet of 42-inch sewer, and 2,300 feet of 36-inch sewer; also for the construction of a sewer in Westbourne Parkway, and a storm water overflow, consisting of 970 feet of 4-feet, 3-inch sewer and 1,300 feet of 36, 30, 27, 18-in. sewer. The two jobs will cost about \$100,000. Bids which were in details covering thirty or more items, were referred to engineering department for computation. Report will be made by street board to the contract board in a few days, when contract will be let. An unofficial calculation was that Charles H. Slocum & Co. were low bidders on both contracts.

Denver, Colo.—Board of Public Works of City and County of Denver has adopted full details and specifications for construction of sub-main, lateral sewers and appurtenances for sanitary drainage in and for Part "A" of Sub-District No. 18 of the West and South Side Sanitary Sewer District.

Lafayette, Ind.—David H. Lutz presented petition to Board of Works asking that sewer capable of caring for needs of Oakland Hill be constructed.

Muscatine, Ia.—One of most gigantic sewerage improvements ever worked out in Iowa city is under contemplation by Muscatine city council. Local aldermanic body is now considering advisability of making sewer out of creek which runs through east end of city. Improvements will call for expenditure of \$300,000, but reclamation of wide area in that section of city will, it is pointed out, reimburse city for investment. Council has ordered estimates of cost and expects to advertise for bids soon.

Louisville, Ky.—Samuel T. Mann, City Engineer in New Albany, has made favorable report to Board of Public Works on proposed extension of sewer system into Silver Grove suburb, whereupon Board of Public Works directed H. E.

Jewett, City Attorney, to prepare resolution providing for extension to be submitted to City Council at its regular meeting. Proposed sewer is to extend from terminal of sewer system at Silver street through alley between Culbertson and Elkin avenues to Indiana avenue, in Silver Grove. It will be constructed with view of additional extension.

Holyoke, Mass.—To build a storm sewer in Hampden St., from School St. to Linden St., that will keep Hampden St. dry is plan of Board of Public Works. City Engineer T. J. McCarthy is drafting plans for special pipe line that will be laid just beneath first surface of the ground.

St. Joseph, Mo.—Ordinance has been passed to provide for construction of sewers in portion of Sewer District No. Forty-six (46), located in Twenty-second street from Patee avenue to Herman avenue to Twenty-third street; also sewer connecting with the above described sewer on Herman avenue at the alley between Twenty-second and Twenty-third streets and extending South in said alley into Olive street. Also ordinance to provide for construction of sewers in a portion of Sewer District No. One Hundred Twenty-one (121), located in Marion street. R. Van Houten is Deputy City Comp.

Dunellen, N. J.—Plans for the establishing of a local sewerage collection system are being discussed.

Plainfield, N. J.—At regular meeting of Common Council proposals were received for constructing addition to present system of sewers. Nine bids were submitted by following contractors: T. Foster Callahan, of Elizabeth; Saboerker, Mobus & Meeker; Burke Bonham and Charles A. Peterson, of this city; Kelly & McFeeley, Camden; James Tusco, Newark; L. S. Fulton, Elmhurst, L. I.; DeLa Porelle Construction Co., Hackensack, and John W. Heller, Newark. Bids were referred to committee on sewers. The contract will be awarded in a few days. The DeLa Porelle Co.'s bid was lowest, being about \$5,000 less than any of the others.

Roselle, N. J.—Acting upon recommendations made by Borough Engineer Jacob L. Bauer, Roselle Borough Council has decided to request Linden township to co-operate in construction of sewer system for benefit of adjoining sections of two municipalities.

Binghamton, N. Y.—City Engineer John A. Giles is expected to present to Common Council report on plans ordered by Common Council to drain swamp land in 11th Ward. It is proposed to construct sewer and culvert across Chenango St. at Bromley Ave., diverting water of Brandywine Creek into river at that point and to build trunk sewer down Brandywine Creek to care for drainage of that section of city.

Brooklyn, N. Y.—Board of Estimate and Apportionment will devote nearly entire time of its next meeting to discussion of adoption of definite policy relative to authorizing sewer street paving and sidewalk improvements, cost of which would be charged against Street Improvement Fund. Borough President Pounds of Brooklyn says that \$3,000,000 is needed right away for sewers in Brooklyn, besides large amounts needed for highways. President Connolly of Queens says that his borough needs \$2,000,000 at once to afford necessary relief for that borough.

Newburgh, N. Y.—Recommendation of extension of sewer on Robinson avenue as sanitary measure, has been made to City Council at meeting of the Board of Health. Addition will mean construction of 860 ft. of sewer.

Niagara Falls, N. Y.—Sewer bonds in sum of \$160,000 have been sold to Isaac W. Sherrill of Poughkeepsie.

Niagara Falls, N. Y.—Upon motion of Commissioner Cole City Clerk and City Engineer were directed to advertise for bids for sewers, bids to be returnable July 21, 1914, at 7.30 p. m. Thos. H. Hogan is Clerk.

Rome, N. Y.—Board of Water and Sewer Commissioners are trying to secure plan of sewage disposal which will eliminate cost of pumping.

White Plains, N. Y.—Engineer has been directed to draw plans for sewer in Intervale St. Sewer will be 140 ft. long.

Canal Dover, O.—Contracts for sewage treatment plant for population of 12,000 will be let the latter part of July. Mr. George E. Arnold, New Philadelphia, O., is City Engineer of Canal Dover, and R. Winthrop Pratt, Cleveland, O., is Consulting Engineer.

Delaware, O.—Notice is hereby given that Board of County Commissioners of Delaware County, Ohio, will sell county ditch bonds to amount of \$12,000 on Monday, July 27, 1914 at hour of 2 o'clock p. m., at office of the County Commissioners of Delaware County, Ohio, W. V. Aldrich is County Auditor.

Altoona, Pa.—Ordinance No. 75, providing for vitrified clay pipe sewer in 14th St., between 12th and 13th Aves., has been passed finally.

Youngstown, O.—Bonds will be sold on July 20 for construction of various sewers. D. J. Jones is City Auditor.

Eugene, Ore.—Sewer committee has recommended granting of petition of lateral sewer to be built of cement pipe, beginning at point 182 feet east of Ferry street on Ninth avenue east and extending to mill race. Recommendation was adopted.

Allentown, Pa.—Plans are being made for construction of sewer system.

Elwood City, Pa.—Ordinance providing for construction of sewer from Third street and Franklin avenue to Park avenue and then to Fourth street, has been passed on first and final reading.

Wilkes-Barre, Pa.—Ordinance has been adopted providing for borrowing of sum of sixty thousand dollars, and issuance of bonds, proceeds of sale whereof are to be used for purpose of construction of sewer system in Borough of Parsons, county of Luzerne. Michael M'Hale is Chief Burgess.

Williamsport, Pa.—Ordinance has been passed providing for construction of storm water sewer from Almons street east to McClure's run in Washington street.

Williamsport, Pa.—Resolution has been passed providing for construction of house sewer in Smith street; providing for construction of house sewer in Scott street.

Huron, S. D.—Resolution has been adopted for construction of lateral sewer in Sewer District No. 61, Dakota Ave.

Beaumont, Tex.—Bonds to amount of \$175,000 will be voted on for purpose of constructing an effective system of drainage in District No. 5.

Dallas, Tex.—City Engineer's force has completed survey of tract at foot of Cadiz St. which will be used as site for pumping station to be erected in connection with proposed sewage reduction plants. Plants will be made from surveys within short time. Survey was made to relocate large interceptor sewers which will run to pumping station, original plans for plant having been changed when city decided to purchase Cadiz St. site.

Galveston, Tex.—Authority has been granted to Commissioner Shay to advertise for bids for construction of number of sewer laterals in southwestern section of city. Work contemplated includes little more than one mile of sewer laterals and will complete work outlined for present year and provided for in annual budget.

Galveston, Tex.—Work of laying sewer laterals in western section of city will begin shortly.

CONTRACTS AWARDED.

Stockton, Cal.—For construction of 6-in. diameter vit. clay pipe sewers in various streets, to F. C. McIntire, of Stockton. L. F. Kuhn is City Clerk.

Hartford, Conn.—Bids have been opened by board of contract and supply for tile sewer in Hillside avenue from Ward place to Wilson street, and in Barker street from Wethersfield to Franklin avenues. There were six bidders as follows: C. H. Slocom & Co., \$2,320.50; W. T. Ryan Construction Co., \$2,289.80; Rocco and Francis Brencier, \$2,240.14; George D. Berardino, \$2,167.06; Louis Rogers, \$3,104.05; Bernardino & Silvestri, \$2,043.62. Contract was awarded to Bernardino & Silvestri, lowest bidders, for \$2,043.62.

Southington, Conn.—To Berardino & Tomassetti, of Meriden, Conn., at about \$109,000, for installation of sewer system.

Augusta, Ga.—For laying 10-in. reinforced concrete sewer in Reynolds St. from 8th to 11th Sts. to Wm. F. Bowe, at \$10,780.

Sac City, Ia.—The Sac City council has awarded to Hawkeye Construction Company, of Waterloo, contract for 3,500 feet of sanitary sewer, and another for 1,200 feet of four-inch water mains. These improvements will involve expenditure of nearly \$4,500.

Topeka, Kan.—To James A. Pringle, of Carthage, Mo., contract for construction of three sewers in city at total bid of \$86,875.25.

New Orleans, La.—To Theodore O. Hotard, at about \$101,000, for contract 65-D, for reinforced concrete canal in Leonidas street, from Spruce to Claiborne avenue, and in Lowerline from Jeanette to Claiborne.

Albany, N. Y.—To Riverdale Contracting Co., of New York City, at about \$232,373, construction of sewage disposal plant.

Newark, N. J.—Contracts for sewers on Maple avenue, Indiana, Seventh, North Gay and Tenth streets, have been let to A. R. Pitser, lowest bidder.

Painesville, O.—For constructing Liberty St. storm sewer to Chapman & Grover, Lorain, at following bid: 1,622 ft. 30-in. drain sewer pipe, \$2.94; 890 ft. 27-in. drain sewer pipe, \$2.66; 585 ft. 24-in. pipe, \$1.60; 760 ft. 20-in. pipe, \$1.25; 2,320 ft. 6-in. house sewer, 40 cts.; 58 branches on 30 x 6-in. drain sewer, \$3.50; 30 branches on 27 x 6-in. drain sewer, \$3; 9 branches on 24 x 6-in. pipe, \$2.75; 25 branches on 20 x 6-in. pipe, \$1.80; 1,571 ft. 18-in. pipe, \$1.10; 552 ft. 15-in. pipe, \$1; 68 ft. 12-in. pipe, 87 cts.; 23 branches on 18 x 6-in. pipe, \$1.50; 1 branch on 30 x 10-in. drain sewer, \$3.50; 8 branches on 18 x 10-in. pipe, \$1.50; 6 branches on 15 x 10-in. pipe, \$1; 4 branches on 12 x 10-in. pipe, 80 cts.; 18 manholes, \$25; 2 catch basins, \$30; 45 inlet basins, \$20; 872 ft. 10-in. inlet basin pipe, 70 cts.; 4 M ft. sheathing left in trench, \$40; total, \$14,733. Also for Richmond St. sanitary sewer, to O. M. Stevenson & Co., Erie, Pa., as follows: 5,318 ft. 24-in. pipe, \$2.20; 1,658 ft. 20-in. pipe, \$1.80; 70 ft. 15-in. pipe, \$1.40; 12 ft. 24-in. cast-iron pipe, \$8; 1,800 ft. 6-in. house sewer, 37 cts.; 46 branches on 24-in. pipe, \$4.25; 54 branches on 20-in. pipe, \$2.85; 23 manholes, \$30; 77 ft. manholes, additional depth, \$5; 445 cu. yds. rock excav., \$1.50; 4 M ft. sheathing left in trench, \$40; total, \$17,813.

Eugene, Ore.—Bids for construction of lateral sewer in alley between 5th and 6th Aves. west from Filmore St. to Polk St. have been opened as follows: Stein Bros., \$728.28, cement pipe; R. Yergle, \$732.26, cement; Hall & Soleim, \$721.21, cement or clay; C. H. Mahany, \$770.15, cement; Ole Soleim, \$667.23 for vitrified clay and add 5 cts. a ft. for cement. Sewer committee after figuring difference in Soleim's bid for cement and that for clay, recommended awarding contract to him.

Portland, Ore.—For constructing vitrified pipe sewer in Rhine St., to William Lind, of Portland, at \$108,599.

Seaside, Ore.—For constructing sewer system to C. S. Randle.

Aliquippa, Pa.—For constructing storm sewers, to S. B. Markley at \$9,107. I. S. Patton is Borough Secy.

Hazleton, Pa.—At special meeting of Council contract was awarded for construction of sewer on East Diamond Ave and Hayes St. to Pasquale Pacenzo at \$913.37.

Lebanon, Pa.—For constructing second unit of domestic sewerage, as follows: For two sections, J. V. Fritchey, of Montello, Pa., at \$49,026 and \$44,377, respectively, and to Bennett & Randall, Greensburg, Pa., at \$50,085, for third section.

Lebanon, Pa.—Contracts for North Side sewer system have been let by council at special meeting when firm of Bennett & Randall was awarded contract for first section which includes North Side east of Seventh street and two other sections were awarded J. U. Fritchey & Son, of Lancaster, lowest on these respective parts by \$10,000. Latter's work will comprise construction of mains in section west of Seventh street.

Parsons, Pa.—To D. M. Rosser, of Wilkes-Barre, Pa., for installation of proposed sewer system in three sections, as follows: First district, \$17,499; second district, \$20,428; third district, \$3,881.

Superior, Wis.—By board of public works, contract for construction of new lateral sewer to be laid in alley between Missouri and Maryland avenues, from Belknap street to Twenty-fourth street to Pastoret & Company. Total cost, \$11,000.

Superior, Wis.—Contracts for construction of sewers aggregating \$32,000, which will serve only portion of city now without such facilities—the Tenth ward—have been let by board of public works to Riches & Anderson.

WATER SUPPLY

Glendale, Ariz.—Citizens have authorized \$50,000 in bonds for purchase of waterworks from Sine Bros. Storage reservoir will be built.

San Francisco, Cal.—The Napa City Water Co. has asked leave of State Railroad Commission to issue \$10,000 5 per cent. bonds, to acquire distributing system of Theodore A. Bell on Alta Heights.

Hartford, Conn.—Board of Finance has recommended issue of water supply bonds to amount of \$2,000,000.

Canton, Ill.—Plans are said to be completed for water distributing system, to cost \$20,552. M. F. Felix is Mayor.

La Salle, Ill.—The shortage in supply of water in this city caused Alderman John Hynds of Sixth Ward to propose that city secure figures showing approximate cost of water tower or standpipe to be erected in north end of city, to conserve supply of water for use in such emergencies as one now confronting city. The matter was referred to water works committee and Engineer Byrne to investigate along lines of Mr. Hynds' suggestion and to report back to Council.

Rock Island, Ill.—Bids will shortly be asked by City Comm. for centrifugal pump of 6,000,000 gals. capacity for water works plant. Bids will also be asked for electric, steam and oil driven machines. R. V. Sharpe is Supt. of plant.

Mishawaka, Ind.—City will expend about \$30,000 for purchase and installation of water meters.

Morning Sun, Ia.—Plans are being prepared by Harper & Stiles, Grand Ave. Temple, Kansas City, Mo., for construction of water works.

Douglas, Kan.—City is considering \$15,000 bond issue for construction of distribution system. C. A. Ogg is City Clerk.

Haverhill, Mass.—Alderman Bartlett is to recommend to Municipal Council that city extend its high pressure water service from Main St. through common and thence over to Pleasant St. for purpose of increasing fire protection for Pleasant St. factory district. Alderman recommends that four-way hydrant be installed on Pleasant St., believing that business portion of that district should receive better fire protection.

Lowell, Mass.—Commissioner of Water Department is in favor of erection of purification plant to cost \$250,000. William L. Vennard is City Engr.

Webster, Mass.—Town has voted appropriation of \$75,000 for erection of concrete reservoir. Michael Schofield is Supt. Water Dept.

Billings, Mont.—Bonds in sum of \$450,000 for purchase and improvement of water plant will be sold on August 15th.

Harlowtown, Mont.—City Council will call election to vote on issuing \$15,000 bonds for water works.

Albany, N. Y.—City Council has passed ordinance authorizing \$200,000 bond issue for water mains extension.

Lestershire, N. Y.—Taxpayers of village are voting on \$10,000 bonding issue for water works. Every indication points toward passing of issue by large majority.

Winston-Salem, N. C.—Citizens have voted \$50,000 bonds for improvements to water works.

Canal Dover, O.—R. Winthrop Pratt, Cleveland, O., has been retained by Council to co-operate with Mr. George E. Arnold, City Engineer, in preparation of report regarding present water works. Report will include recommendations for necessary changes and improvements.

Sandusky, O.—Because of extra amount of work occasioned by deplorable condition of old filtration plant, \$22,000 will be needed to complete repairs, according to figures submitted by Chief Engineer Robert Wagar at Council meeting.

Sandusky, O.—Estimates for construction of 12-in. water line to south end district have been prepared by City Engineer Wagar. Cost is estimated at \$25,000.

Baker, Ore.—City Council will construct by day labor 2 pipe lines for water system at cost of \$98,000.

Mollalla, Ore.—City Council will spend about \$10,000 for installation of water system.

Mollalla, Ore.—Council has passed ordinance authorizing sale of \$10,000 bonds for constructing water system.

Charleston, S. C.—Charleston Water & Light Co. is considering installation of about 5,200 water meters during next two years, at estimated cost of \$75,000.

Seattle, Wash.—Plans and estimates have been submitted by A. H. Dimock, City Engr., to Bd. Pub. Wks. for con-

structing water mains in Ranier Ave., to cost \$24,000; also 47th Ave., N. E., to cost \$10,000.

CONTRACTS AWARDED.

Rockford, Ill.—To S. B. D. Geiger, Chicago, for boring 22-in. well, as follows: In Hulin Park, \$8,990. Other bids W. H. Cater, Chicago, \$14,400; M. P. Peterson, Madison, \$11,600; J. P. Miller, Chicago, \$10,350.

Lewiston, Me.—For installing new pumps at water works, to Dean Steam Pump Co., Holyoke, Mass. Y. B. Longley is Supt.

Kansas City, Mo.—To Badger Meter Co. of Milwaukee, Wis., the furnishing of 2,500 water meters.

Lewistown, Mont.—For constructing gravity water system to replace old wooden water pipe line, 16-in. steel, awarded to A. M. Holter Co., of Helena, at \$62,977.

Reading, Pa.—For repairing and reconstructing Antietam Dam, to William H. Dechant, Baer Bldg., Reading, at about \$16,000.

Beaumont, Tex.—To Bash & Gray, of Joplin, Mo., at \$24,290, for building of settling basin. The Rensselaer Valve Co., of Troy, N. Y., will install valves, fittings and other small improvements, at \$324. American Cast Iron Pipe Co. will furnish pipe.

Fort Bliss, Tex.—For extending water system, to Mayfield & Shaw, at \$15,000.

Superior, Wis.—By Board of Public Works to Superior Water, Light & Power Co., contract for installing water and gas connections on following streets: Water connections—West Seventh St., G Ave. to P Ave.; Tower Ave., from 58th St. to 64th St.; the south side of Belknap St., from Clough Ave. to Catlin Ave.; the north side of Belknap, from Clough Ave. to Hill Ave. Gas connections—West Seventh St., from G Ave. to N Ave.; the north side of Belknap St., from Cedar Ave. to Hill Ave.

LIGHTING AND POWER

Havana, Ill.—Plans for installation of power plant which will be used only for operation of ornamental street-lighting system are being prepared.

White Hall, Ill.—City Council will engage engineer to make plans and specifications for municipal lighting plant.

Portland, Ind.—The work of installing new street lighting system in business districts of this city has started. The new ornamental posts have not yet arrived but work of drilling curb and sidewalks and making trenches for underground conduits will be done at this time and be in readiness for quick completion of work when material comes.

Richmond, Ind.—Bids for 375 street lamps will be advertised for some time shortly and until these bids have been received no decision will be made as to type of lamp city will purchase, although city officials strongly favor luminescent lamps.

Clinton, Ia.—The Lyons boulevard lighting system has been assured, and lights will be installed just as soon as possible.

Easton, Md.—The \$74,000 5 per cent. town bonds have been sold to Baltimore brokers for \$80,425. Bids for building and equipping electric light plant were opened, lowest being Wilson Maltman & Co., of Baltimore, at \$22,660.

Lexington, Mass.—Plans are being considered for installing ornamental lighting system through center of town.

St. Clair Heights, Mich.—Village Trustees are discussing installation of new lighting system. Francis J. Miller is President of Board.

Wyandotte, Mich.—Citizens have voted to issue \$40,000 bonds to improve municipal water works and electric light plant.

St. Joseph, Mo.—Ordinance has been passed appropriating sum of \$840 to be used in construction of extension of city's electric light system. R. Van Houten, Deputy City Comp.

Fort Benton, Mont.—Council is considering plans for expenditure of \$17,000 for purchase of electric light plant and improvement of same.

Butler, N. J.—Citizens have voted in favor of \$30,000 bond issue for constructing municipal electric light plant. Emery S. Burlison is Boro. Engr.

Westby, N. D.—Plans are said to be in progress for installation of electric light plant.

Columbus, O.—City Council will authorize bond issue of \$18,000 for purchase of new equipment for municipal electric light plant, in order that cluster lamp lighting system in city may be extended.

Lima, O.—Bond issue of \$70,000 for municipal electric plant and boulevard lighting system is being urged.

Birdsboro, Pa.—Council is considering election to submit proposal to make appropriation for installation of municipal electric light plant.

Parker, S. D.—J. F. Druar, consulting engineer, Commercial Building, St. Paul, Minn., is preparing plans for installation of electric light plant and extensions to waterworks system, to cost about \$27,000.

Handley, Tex.—Plans are being considered for installation of electric lighting system.

Barboursville, W. Va.—City Council is discussing installation of municipal electric light plant to cost about \$5,000.

Milwaukee, Wis.—F. A. Vaughn, of Milwaukee, will make survey of streets for purpose of improving street lighting system.

CONTRACTS AWARDED.

St. Petersburg, Fla.—Frank J. Stamm, of this city, has been awarded contract to put down all gas pipe for new municipal gas plant. The contract amounts to about \$12,000.

Summerfield, Kan.—For electric lighting system and 18 miles of transmission line, to Bushong Electric Works, Ottawa, Kan. D. L. Stromquist is Consulting Engineer, Summerfield.

Springfield, Mass.—Contract has been awarded to the Morris Iron & Steel Co., through their Boston representative, Mr. W. St. Clair Jones, for 450 goose neck arc and 200 inverted arc poles.

Little Fork, Minn.—Contract for construction of electric light plant has been awarded to H. E. Dudrey, Moorhead, Minn.

New Brunswick, N. J.—By resolution of gas and lamp committee Common Council has voted to enter into two-year contract for street lighting with Public Service. By terms of resolution, Public Service agrees to furnish regular commercial 2,000 candle power arc lights at \$80 per lamp up to 250 lamps, and \$75 per lamp over 250 and up to 750 lamps. Also 32 candle power lamps for \$20 per lamp up to 50 lamps; \$18.50 per lamp from 50 up to 100 lamps, and \$17 per lamp from 100 up to 200 lamps.

Erie, Pa.—For laying conduit system in State St. to Joseph McCormick & Bro., of Erie. B. E. Briggs is City Engr.

FIRE EQUIPMENT

Bridgeport, Conn.—Electors may be asked next November to authorize issuance of \$100,000 fire bonds, to be used in building fire-houses in North End and Black Rock sections of city, equipping same with proper fire-fighting apparatus and installing manual fire alarm system, with fireproof building for housing of same.

Bristol, Conn.—Installation of a new alarm system is being discussed. William H. Carpenter is Fire Commissioner.

Hartford, Conn.—Bids have been opened for furnishing fire department 1,000 ft. more or less, of 3-in. fire hose, and 2,000 ft. more or less, of 2½-in. fire hose. Bids were as follows: Jewell Belting Co., 2½-in., 89c per ft.; 3-in., \$1.29 per ft. C. C. C. Fire Hose and Rubber Co., Canton Junction, Mass., 2½-in., 68¾c per ft.; 3-in., 97¾c per ft. Combination Ladder Co., Providence, 2½-in., 69¾c per ft. Bi-Lateral Fire Hose Co., Chicago, 3-in., \$1 per ft.; 2½-in., 80c per ft. Hartford Contractors' Supply Co., 2½-in., 85c per ft.; 3-in., \$1.15 per ft. Bids were referred to fire board for calculation and report. The C. C. C. Co. was lowest bidder, it was said, unofficially.

Oak Park, Ill.—Bonds in sum of \$35,000 have been voted for fire department improvements.

Pittsburg, Kan.—Proposal to issue bonds for erection of new central fire station, and to sell present central station property and devote proceeds to purchase of motor fire trucks and equipment, which failed to carry at a special election a year ago, will be submitted again to voters at special election to be held coincidently with primary election Tuesday, Aug. 4.

Melrose, Mass.—Fire Chief Edwards is urging the purchase of 1,000 ft. of hose.

Ann Arbor, Mich.—At election in the fall question of issuing \$25,000 motor fire apparatus bonds will be submitted.

Minneapolis, Minn.—Expenditure of \$25,000 on purchase of additional motor apparatus is proposed.

Camden, N. J.—Ordinance has been passed authorizing bond issue of \$70,000 for motorization of entire department. John Stockton is Chief.

Newton, N. J.—Sussex Chemical Co. No. 2 will purchase chassis for its apparatus.

Amityville, L. I., N. Y.—Chief Milford H. Ketcham is urging purchase of about 2,000 ft. of hose.

Binghamton, N. Y.—Fire department bonds in sum of \$50,000 will be sold July 13. F. M. Hopkins is secretary Board of Estimate.

Elmsford, N. Y.—Funds are being raised to purchase chemical tanks and other equipment for auto which was procured recently.

Greenport, L. I., N. Y.—Funds are being raised for installation of fire alarm system.

Niagara Falls, N. Y.—Purchase of tractor for hook and ladder truck is being considered.

Sidney, N. Y.—Purchase of a motor combination chemical and hose wagon has been authorized.

White Plains, N. Y.—Petition has been submitted to Board of Trustees, calling for submission of proposition to taxpayers of appropriating \$15,000 for brick fire house for East Side Hose Company.

Cincinnati, O.—Purchase of oxygen helmets is under consideration.

Kittanning, Pa.—Borough Council wishes to meet representatives of fire hose companies in special meeting on evening of July 20 for purpose of purchasing 2,000 ft. of fire hose.

Lewistown, Pa.—Fire Chief T. S. Johnson has sent to Council his recommendation for 500 ft. of new hose for Fame Fire Co., and also 500 ft. for City Fire Co. Council accepted the fire chief's recommendation. Another motion was adopted referring matter of purchase of hose to fire and borough property committee.

Williamsport, Pa.—Resolution has been passed providing for purchase of 1,500 ft. of fire hose.

St. John, N. B.—Commissioner of Public Safety H. R. McLellan will expend \$20,000 for motor apparatus. George Blake is Chief.

CONTRACTS AWARDED.

Sacramento, Cal.—City Commission has voted to buy \$27,250 worth of motor-driven fire apparatus, bids of Ahrens-Fox Fire Engine Company of Cincinnati, being accepted in case of each machine. Following were contracts awarded: Chemical engine, \$6,250; chassis for chemical, \$5,250; pumping engine, \$10,000; tractor for aerial truck, \$5,750.

Sioux City, Ia.—For new apparatus contracts are as follows: To Bennett Auto Supply Co., local agents of White Co., for two motor combination chemical and hose wagons, at \$10,500; 12-circuit repeater alarm system, to the Star Electric Co., Binghamton, N. Y., at \$4,963; for hose, to the New York Belting & Packing Co., of New York City, for 2,000 feet, at \$1.10, and the Eureka Fire Hose Co., of New York City, for 1,000 feet, at \$1.10.

Port Jervis, N. Y.—To Allison F. Coe, contract for remodelling of South Main St. fire house at \$7,757.

Hazleton, Pa.—Resolution ratifying execution of hose contract entered into by committee of Council, with Eureka Fire Hose Co., of New Jersey, has passed third and final reading. Contract calls for 1,000 ft. of hose at 70 cts. per ft.

Meadville, Pa.—To American-La France Fire Engine Co., Elmira, N. Y., for a motor city service truck and motor combination chemical and hose wagon.

BRIDGES

Galesburg, Ill.—City Engineer Connolly is working on plans for new bridge over Cedar Fork on North Broad St. and structure will be installed during present season.

Fort Wayne, Ind.—City has signed contract with county by which board of works agrees to shoulder cost of new approaches to Harrison St. bridge. It will be necessary to repave Harrison St. 120 ft. south of bridge, raising grade about 4 ft. at bridge. This work will be done this summer.

Indianapolis, Ind.—Among bids on proposed West Washington St. bridge over White River submitted to Board of County Commissioners were several which are within the \$350,000 appropriation made by County Council. Announcement was made by John Kitley, president of the Board, that contract would be awarded later. This is the second set of bids to be opened by Commissioners, first set being rejected when County Council refused to accede to demand of

Commissioners and declined to appropriate more than \$350,000, taking the position that the bridge should not cost more than \$350,000. The low bid on plans and specifications prepared by Paul Julian, county surveyor, was submitted by Union Asphalt Construction Co., the bid being \$339,105 on stone faced concrete bridge, and \$319,105 on a plain concrete bridge. The Cleary-White Construction Co., of Chicago, which submitted the low bid of \$418,000 on Julian's plans, when the first set of bids was received, bid \$398,074.25 on stone faced concrete bridge and \$339,571.65 on plain concrete bridge. The Cleary-Kuert Construction Co. submitted bid of \$376,910.42 on stone faced concrete bridge and \$358,466 on a concrete bridge. The American Construction Co. submitted bid of \$405,756.60 on a stone faced concrete bridge and a bid of \$344,516.40 on a plain concrete bridge. The Marion County Construction Co. submitted bid of \$418,678 on a stone faced concrete bridge, and a bid of \$349,379 on a plain concrete bridge. The National Concrete Co., which submits bids on plans prepared by David P. Luten, and not on county surveyor's plans, submitted bid of \$349,255 on four span stone faced concrete bridge, a bid of \$325,155 on a four span plain concrete bridge, a bid of \$354,710 on a five span stone faced concrete bridge, and a bid of \$331,110 on five span plain concrete bridge.

Clinton, Ia.—Construction of several culverts and bridges are being considered. F. G. Hansen is Auditor.

Baltimore, Md.—That the building of new Patapsco river bridge at Spring Gardens will be let in six separate contracts has practically been decided by State Roads Commission.

Holyoke, Mass.—The Elmwood dingle passageway question has been finally decided. The board has voted to recommend erection of bridge over dingle giving people of district affected outlet to Sergeant St.

Chillicothe, Mo.—Members of Township Board are considering erection of concrete bridges in various sections.

Jefferson City, Mo.—People residing near Robison's ford on old St. Louis road, have circulated petition to build bridge over Moreau at that place.

Amsterdam, N. Y.—State of New York has purchased \$125,000 worth of bridge bonds issued by City of Amsterdam. Bonds were first purchased by Adams & Co., of New York, and now Comptroller has bought them for state.

Charlotte, N. C.—Board of Commissioners of county have received and accepted plans and specifications for proposed new bridge to be erected over Catawba River at Mount Holly, these being furnished by the Virginia Iron & Bridge Co. It is purpose of two bodies to advertise for bids. Bridge is to cost in neighborhood of \$40,000 and cost is to be borne proportionately by counties of Glaston and Mecklenburg.

Wilkes-Barre, Pa.—Erection of proposed East End bridge will cost city and railroads interested in scheme in neighborhood of \$115,000. The bidding was done on 19 separate items, amount of material, etc., being estimated by architect. The totals based on these items are as follows: Neeld Co., \$82,788.20; Penn Bridge Co., Beaver Falls, Pa., \$84,479; McHarg-Bart & Co., New York, \$88,086; Williams & Richardson, Scranton, \$88,524.50; D. M. Rosser, Kingston, \$90,687; Mason-Hilton & Co., New York, \$91,051; Barzaghi-Vought Co., New York, \$96,115.20; J. W. Heller, Newark, N. J., \$96,238; B. G. Coon Construction Co., Kingston, \$100,423; Whiting-Turner, Baltimore, Md., \$12,833.33; Whittaker & Diehl, Harrisburg, \$128,417.10.

Wilkes-Barre, Pa.—Plans are being discussed for erection of Market St. structure.

Austin, Tex.—The Attorney General's Department has approved \$60,000 bridge bond issue of Brazoria County. Brazoria County will erect combination wagon and railroad bridge over Brazos river connecting Velasco and Freeport, a part of the expense to be borne by Houston and Brazos Valley Railroad.

Bastrop, Tex.—The \$50,000 bond issue for bridge and good roads purposes has been carried almost unanimously in Justice Precinct No. 1, composed of towns of Bastrop, Goodman and Hill's Prairie.

Lockhart, Tex.—In election held here for issuance of bonds to amount of \$3,000 to build bridge on North Commerce street, vote was 108 for and 18 against.

Houghton, Wis.—Residents of Laird and Baraga townships of this county have just held meeting at which it was decided to unite for road construction

and bridge building. It was decided to build bridge across the Sturgeon river on line between townships.

CONTRACTS AWARDED.

Colorado Springs, Colo.—For constructing bridge over Fountain Creek awarded to Pueblo Bridge Co., Pueblo. Company bid \$11,680 for concrete girder bridge and \$13,875 for concrete arch bridge. Henry McAllister is Deputy Co. Clk.

Indianapolis, Ind.—By Board of Public Works, contract to Central States Bridge Co. for constructing superstructure of proposed bridge across Pleasant Run at Minnesota St., at \$7,335.

Kokomo, Ind.—County Commissioners have awarded contracts for O'Dowd Ford bridge, the McCann St. bridge, the Wright bridge and discussed Ohio Ave. bridge, but took no decisive action. The lowest bid on work is by I. E. Smith, of Richmond, his price being \$9,660 on flat top concrete bridge 175 ft. long and 30 ft. wide. The appropriation amounts to \$10,000. The preliminary expenses of engineering will bring the cost about \$100 over \$10,000. The contracts awarded on other bridges were as follows: O'Dowd bridge, Burk Construction Co., \$8,349; McCann St. bridge, National Concrete Co., Indianapolis, \$6,300; Wright bridge, Indiana Bridge Co., \$1,049. The O'Dowd and Wright bridges are to be steel bridges, while McCann bridge is concrete.

Paducah, Ky.—Contract for construction of piers for Burlington bridge at Metropolis, Ill., twelve miles below here, has been awarded to Union Bridge Construction Company, of Kansas City, Mo.

Paterson, N. J.—For constructing four highway bridges in Passaic County to Logan Construction Co., 11 Broadway, New York.

Rahway, N. J.—For constructing concrete arched bridge over Rahway River, at St. George Ave., to J. S. Shanley Co., Newark, at \$19,167.

Highland, Pa.—Commissioners of Chester county have awarded contract for building of iron girder bridge over Dee Run, between Highland and Londonderry townships, to Corcoran Construction Company, of West Chester, for \$2,828.

Holidaysburg, Pa.—By County Commissioners of Blair County, Holidaysburg, for constructing 11 reinforced concrete bridges in various parts of county. Contracts to E. H. Brua, Holidaysburg; Curwensville Construction Co., Curwensville, Pa.; Fogel & Co., Holidaysburg; Loomis & King, Altoona, Pa.; Vipond Construction Co., Altoona.

Waynesburg, Pa.—For constructing concrete arch bridge 25 ft. span over Pumpin Run by County Commissioners to Crossan Construction Co., Brownsville, at \$10,778.

York, Pa.—Contracts for construction of one stone arch and five reinforced concrete bridges and reinforced concrete abutments at another structure across streams in county have been let by county commissioners. Awards were made to lowest bidders and improvements will be made at aggregate cost of \$14,433. Successful bidders and amount of their bids are as follows: Reinforced concrete, twin arch bridge over west branch of the Codorus creek, near Graybill station, on the Northern Central railway, on road leading from Seven Valleys to Graybill station, between North Codorus and West Manchester townships. Twin spans, 72 ft. opening, 14-ft. roadway. G. A. & F. M. Wagman, Dallastown, \$5,775. Reinforced concrete girder type bridge over Shrewsbury branch of Codorus creek near Seitzland to Shrewsbury, in Shrewsbury Twp. One span 20 ft. with 14-ft. roadway. G. A. & F. M. Wagman, Dallastown, \$700. Stone arch bridge, in Peach Bottom township, over Fishing creek, at Miller's mill, on road leading from Woodbine to Delta. One span 25 feet, 14-ft. roadway. William Wagman & Bro., Dallastown, \$979. Reinforced concrete arch bridge over south branch of Muddy creek, at Grove's mill between East Hopewell and Fawn townships, on road leading from Cross Roads and New Park. One span 50 ft., roadway 14 ft. G. A. & F. M. Wagman, Dallastown, \$2,395. Reinforced concrete arch bridge over Cabin creek in Lower Windsor township, on road leading from East Prospect to Craley. One span 40 ft., roadway 14 ft. Samuel Arch, Windsor, \$1,850. Reinforced concrete arch bridge over Manhattan creek in Mt. Wolf borough, on road leading to Manchester borough. One span 30 ft., roadway 16 ft. Walter Drawbaugh, Dover, \$1,735.

Reinforced concrete abutment at bridge across Big Conewago creek on road leading from Manchester to York Haven, G. A. & F. M. Wagman, Dallastown, \$999.

Eau Claire, Wis.—To Union Construction Co., Eau Claire, for construction of new reinforced concrete bridge over Otter Creek, between Eau Claire and Altoona, Wis.

Superior, Wis.—Contract for building steel and concrete bridge over Nemadji at Borea has been let to Iowa Bridge Co. on bid of \$5,219.50. Bridge is to be located six miles north of state line, near Soo railway.

MISCELLANEOUS

Birmingham, Ala.—Many samples of street signs have been accumulated in offices of City Engineer Julian Kendrick. Mr. Kendrick has stated that bids on signs would be asked for probably within next 10 days. Thousands of new signs will be used by city within next few months in renaming the streets and avenues of Greater Birmingham in accordance with ordinance passed several weeks ago and which will go into effect September 1.

Richmond, Cal.—Contractors at various points on coast are already writing City Clerk A. C. Faris to ask about bids for constructing inner harbor channel bulkhead, for which Council has issued a call.

Hartford, Conn.—It has been voted to purchase a dump cart, and to leave the matter with engineer and superintendent of streets.

Washington, D. C.—A business firm in European city informs American Consular officer that it is desirous of being put in touch of manufacturers of vacuum street cleaners, such as are used in various American cities. This cleaner is in form of motor car of about 60 horse-power, which operates cleaning apparatus and supplies locomotion. It is described as being about 18 ft. long and 7 1/2 ft. broad and capable of covering from 11,000 to 15,000 sq. yds of street per hour. No. 13,347, Bureau of Manufactures.

Peoria, Ill.—Building committee of Board of Supervisors have not arrived at any conclusion regarding letting of contract for new court house. The three low bidders are Cullen Construction Co., of Janesville, Wis.; English Bros., of Champaign, and Lampitt & Son, of Pekin. Following are bids received: John Griffith & Sons, Chicago, \$192,500; number of days to complete the work, 275. King Lumber Co., Charlottesville, Va., \$188,936; 360 days. Fred Meintz, Peoria, \$175,000; 420 days. Henry W. Horst & Co., Rock Island, \$179,971; 227 days. Val Jobst & Son, Peoria, \$170,800; 400 days. General Construction Co., Louisville, Ky., \$197,467.25; 350 days. J. D. Goodall & Sons, Peru, Ind., \$193,000; 460 days. H. Eilenberger & Co., Chicago, \$169,282; 225 days. J. D. Cullen Construction Co., Janesville, Wis., \$159,790; 300 days. General Construction Co., Milwaukee, Wis., \$178,860; 360 days. W. M. Allen & Son, Peoria, \$169,900; 200 days. J. T. & J. W. O'Connor Co., Chicago, \$176,000; 220 days. Spady, Albee & Smith, Minneapolis, Minn., \$167,688; 390 days; English Bros., Champaign, \$162,800; 300 days. Lampitt & Son, Pekin, \$165,500; 400 days. F. H. Burnritter, Chicago, \$179,750; 300 days. Bids were on Bedford stone, but most of contractors submitted alternate bid on Green River stone, which is more expensive. Griffith bid added only \$7,500 for Green River stone, while Jobst added \$23,000, the Louisville firm \$22,500, Cullen \$17,710, the Milwaukee company \$9,600, the O'Connor company \$30,000, the Minneapolis firm \$20,200, English \$20,000, Lampitt \$20,000 and Burnritter \$22,700, the others submitting no bid on the Missouri stone, which is the kind used in the Farmers' National Bank building. Bedford stone is used in government building.

Joplin, Mo.—The installation of police call box system is being discussed.

New York City, N. Y.—Chairman McCullough of the Public Service Commission went on record as favoring construction of a subway up Central Park West and hollowing out of Columbus Circle, so as to be ready for any subway plan which might be undertaken at that spot.

Akron, O.—Two bond issues in Summit county have been awarded to R. L. Dollings Co., of Hamilton, O.

Ellwood City, Pa.—Petition has been signed by over four hundred persons requesting that ordinance be passed for systematic disposal of garbage at this place.